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THE NEW INTERNATIONAL ENCYCLOPÆDIA

SECOND EDITION

VOLUME IX

NEW YORK
DODD, MEAD AND COMPANY
1928

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KEY TO PRONUNCIATION

For a full explanation of the various sounds indicated, see the KEY TO PRONUNCIATION in Vol I.

ā as in ale, fate
ä " " senate, chaotic
â " " glare, care, and as *e* in there
ă " " am, at
ȧ " " arm, father
a " " ant, and final *a* in America, armada, etc
a " " final, regal, pleasant
a " " all, fall
ē " " eve
ę̄ " " elate, evade
ĕ " " end, pet
ę̆ " " fern, her, and as *i* in sir, etc
e " " agency, judgment.
ī " " ice, quiet
ı̄ " " quiescent
ĭ " " ill, fit
ō " " old, sober
ȯ " " obey, sobriety
ô " " orb, nor
ŏ " " odd, forest, not.
o " " atom, carol.
oi " " oil, boil
ōō " " food, fool, and as *u* in rude, rule
ou " " house, mouse
ū " " use, mule
ṳ̄ " " unite
ŭ " " cut, but
ṳ " " full, put, or as *oo* in foot, book
û " " urn, burn.
y " " yet, yield
B " " Spanish Habana, Córdoba, where it is like English *v* but made with the lips alone.

ch as in chair, cheese
D " " Spanish Almodovar, pulgada, where it is nearly like *th* in English then
g " " go, get
G " " German Landtag = *ch* in Ger ach, etc.
H " *j* in Spanish Jijona, *g* in Spanish gila, like English *h* in hue, but stronger
hw " *wh* in which
K " *ch* in German ich, Albrecht = *g* in German Arensberg, Mecklenburg, etc.
n̄ " in sinker, longer
ng " " sing, long
N " " French bon, Bourbon, and *m* in the French Étampes, here it indicates nasalizing of the preceding vowel.
sh " " shine, shut
th " " thrust, thin.
TH " " then, this
zh " *z* in azure, and *s* in pleasure.

An apostrophe ['] is sometimes used as in tā'b'l (table), kăz"m (chasm), to indicate the elision of a vowel or its reduction to a mere murmur.

For foreign sounds, the nearest English equivalent is generally used In any case where a special symbol, as G, H, K, N, is used, those unfamiliar with the foreign sound indicated may substitute the English sound ordinarily indicated by the letter. For a full description of all such sounds, see the article on PRONUNCIATION.

A PARTIAL LIST OF THE LEADING ARTICLES IN VOLUME IX

FORAMINIFERA
Mr C William Beebe
FOREIGN MONEY, VALUE OF
Professor Alvin Saunders Johnson.
FOREKNOWLEDGE AND FOREORDINATION
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FOREST LAWS, IN ENGLAND.
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FORESTRY
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FRANCO-GERMAN WAR OF 1870–71.
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Mr. Edward Lathrop Engle; Mr. Irwin Scofield Guernsey; Professor J Salwyn Schapiro.
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FUNGI, EDIBLE AND POISONOUS.
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* Deceased

THE NEW INTERNATIONAL ENCYCLOPÆDIA

FORAM'INIF'ERA (Neo-Lat nom pl, from Lat *foramen*, hole + *ferre*, to bear) A name given by the French zoologist D'Orbigny, in 1826, to a group of minute animals, which at that time were regarded as mollusks, because of their remarkable and beautiful shells They were even ranked with the cephalopods because many of them possess shells spirally coiled, like that of the nautilus In 1835, however, Dujardin recognized their true nature, and since his day the Foraminifera have been considered a subdivision of the Protozoa They are now ranked as an order of Rhizopoda (q v), distinguished from the amœba and its near allies by the form of the pseudopodia, which are very extensile and threadlike, and are constantly anastomosing so that they form a beautiful network of granular protoplasm Another feature which serves to distinguish the Foraminifera is the presence of a shell, although not all rhizopods which have shells are of this order The shell or "test" of the Foraminifera may be chitinous, or calcareous, or arenaceous (i e, made up of particles of sand, mud, sponge spicules, or other foreign material firmly glued together), but it is never siliceous The shells are distinguished as "perforate" or "imperforate," according as they have their walls penetrated, or not, by minute openings or canals through which the pseudopodia project In nearly all cases there is a large opening through which the animal within the shell comes in contact with the surrounding water, and often there are two or more of these "general apertures" In the imperforate forms the pseudopodia are extended only through these general apertures The Foraminifera with chitinous shells are all *Imperforata*, those with arenaceous shells are usually *Imperforata*, but there are many perforate forms, those with calcareous shells show two very distinct sorts of tests—one group having them white, opaque, like porcelain, and imperforate, while the other has them transparent, glassy, and perforate Marking or sculpturing of the surface of the shell is very common in both groups In regard to the form of the shell we find a most extraordinary variety, but the most important point is whether they are monothalamous (unilocular), i e, composed of a single chamber, or polythalamous (plurilocular), i e, made up of several or many chambers The latter forms arise by budding, from a single chamber, the buds remaining attached to the parent Now, since the monothalamous shells may be spherical, ovate, spindle-shaped, star-shaped, or tubular (straight, curved, or coiled) and symmetrical or quite asymmetrical, it follows that the polythalamous shells may be very complex and irregular They are often very beautiful and sometimes reach a considerable size The great majority of the foraminifera are known by their shells alone, comparatively little being known of the animals themselves In those which are known the contractile vacuole is wanting, and even the nucleus is usually indistinguishable, so that their structure would seem to be extremely simple

In regard to their physiology we know that food is taken into the body in the form of minute organic particles, by means of the flowing or streaming movements of the protoplasm which makes up the pseudopodia In addition to this food it is possible that some organic matter in solution in the water is also absorbed and used, for the ability to take carbonate of lime in solution and make use of it to form their shells is one of the most characteristic and obvious features of these animals Their methods of reproduction are only partially understood The processes of fission and of budding are constantly going on In certain forms reproduction takes place by the formation of sporelike young These exceedingly minute germs move about by a single flagellum Such a flagellum-bearing embryo is called a "flagellula" The Foraminifera are chiefly marine animals, but those with chitinous shells are found mostly in fresh water They are all very small, practically microscopic, though the white shells of many of the marine forms are large enough to be seen with the naked eye, quite a number are from 1 to 2 millimeters in diameter, and the well-known genus *Orbitolites* has a polythalamous shell, sometimes 20 millimeters across, while *Nummulites* is an inch in diameter

The shells of Foraminifera are found all over the ocean floor except in the Arctic regions, and in many places form deposits of great extent and thickness It was formerly supposed that the animals lived swimming about in the sea, and that it was only at death that the shells sank to the bottom, but it is now known that comparatively few species are pelagic, and it is probable that most species live on the bottom throughout life Geologically the Foraminifera occur from

Cambrian times down to the present, though they have been most abundant apparently since the close of the Paleozoic era

The classification of the Foraminifera is a matter of unusual difficulty, owing to the very great individual variation that occurs in the form and appearance of the shell It is very doubtful whether the "species" of this order are comparable with the species of higher groups, since little is known in regard to their reproduction and limits of variation Ten families are now generally recognized, the lines of division being based on the composition of the shell, whether polythalamous or not, whether perforate or not, and on the relative arrangement of the chambers The best-known families are the Gromidæ, which includes the fresh-water forms, of which *Gromia* and *Microgromia* are familiar examples, the Miliolidæ, including the huge *Orbitolites*, the Globigerinidæ, with the widespread *Globigerina*, and the Nummulinidæ, including the well-known and characteristic fossil forms *Fusulina* and *Nummulites*

Fossil Foraminifera. The oldest-known Foraminifera appear in the Lower Cambrian rocks of the Province of New Brunswick, Canada, where occur some minute spherical shells that cannot be distinguished in respect of either size, form, or microscopic structure from the modern species *Orbulina universa* Associated with these are species of *Globigerina*, very like those of modern times Many Foraminifera are scattered through the overlying formations up to the Carboniferous system, where they suddenly appear in great abundance Whole beds of limestone in Europe, Asia, Japan, and North America are formed by the closely crowded shells of the genera *Saccamina*, *Endothyra*, *Fusulina*, and *Schwagerina* The two latter genera are not found above the Permian Other extinct genera in the Carboniferous rocks are associated with species of genera that are still living in the Atlantic Ocean and the Mediterranean Sea The Mesozoic rocks have also their Foraminifera in abundance The genera of the family Lagenidæ are predominant in the Liassic and Jurassic systems The chalk deposits of the Cretaceous age of Europe and America consist largely of foraminiferan shells (especially *Globigerina* and *Rotalia*), together with spicules of sponges The members of the order reached their greatest development in Tertiary time, though most of the genera and species found in the rocks of that period are still living in the modern seas The majority of these were more abundant in the earlier period than they are now Certain other forms, like *Orbitoides* allied to *Nummulites*, are restricted to rocks of Tertiary age *Nummulites* (q v) is an important index fossil of the Eocene series, in which its coin-shaped shells constitute great limestone beds in the Alps and Egypt

The well-known *Eozoon* (q v), found in Laurentian limestones in Canada, has long been considered by some authors to be the oldest foraminifer, and likewise the oldest-known fossil organism Careful investigation has proved it to be a mineral concretion

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FORBACH, fôr'bag A town in Lorraine, Germany, at the foot of the Schlossberg, on an affluent of the Rossel, 5½ miles southwest of Saarbrucken (Map Germany, B 4) Much truck farming is carried on Glass, soap, and pasteboard are its manufactures The place is mentioned as early as the tenth century under the name of Furpac After the battle of Spichern, fought on the neighboring heights, Aug 6, 1870, the town was occupied by the victorious German troops Pop, 1900, 8209, 1910, 10,107

FORBES, fôrbz, ALEXANDER PENROSE (1817–75) Bishop in the Episcopal church of Scotland He was born in Edinburgh and studied at the Edinburgh Academy and under Rev Thomas Dale, the poet, in Kent, he also attended the Glasgow University (1833) and won distinction as an Oriental scholar In 1836 he obtained an appointment in the Indian civil service and left England for Madras Returning to his native country in 1839, he obtained a Sanskrit scholarship in Brasenose College At Oxford he became associated with Pusey, Newman, and Keble, leaders of the Oxford movement, and in 1844 was ordained deacon and priest in the Church of England and held a curacy In 1846 he returned to Scotland for a while, but afterward became vicar of Leeds (1847) After the death of Bishop Moir he was called to the see of Brechin (1848) In 1860 he was prosecuted for heresy, because he inculcated the doctrine of the Real Presence, but he made a powerful defense and was acquitted with censure and admonition His *Short Explanation of the Nicene Creed* (1853) and *Explanation of the Thirty-nine Articles* (1867–68), and various commentaries, reviews, etc, were highly esteemed He edited the original lives of St Ninian, St Kentigern, and St Columba in the *Historians of Scotland*, vols v and vi (Edinburgh, 1875), also *The Kalendars of Scottish Saints* (1872) He died at Dundee, Scotland, Oct 8, 1875 Consult Mackey, *Bishop Forbes A Memoir* (London, 1888)

FORBES, ARCHIBALD (1838–1900). An English journalist He was born in Morayshire, Scotland, in 1838 He studied at the University of Aberdeen, served for some years in the Royal Dragoons, and then became special correspondent for the London *Daily News*, in which capacity he accompanied the Prussian army during the Franco-German War, witnessed the close of the Commune, visited India during the famine of 1874, accompanied the Prince of Wales on his

tour through India (1875–76), and was in the Carlist War with Spain, the Servian War, and the Russo-Turkish War of 1877, etc He lectured in Great Britain, the United States, and Australia Among his many works are a military novel called *Drawn from Life* (1870), *My Experiences in the Franco-German War* (1872), *Life of Chinese Gordon* (1884), *William I of Germany* (1888), *The Afghan Wars* (1892), *Tzar and Sultan* (1894), *Napoleon III* (1898), *Black Watch The Record of an Historic Regiment* (new ed, New York, 1910) He died March 30, 1900

FORBES, DAVID (1828–76) A British geologist and chemist, brother of Edward Forbes Born at Douglas, Isle of Man, he specialized in chemistry at the University of Edinburgh, when 19 years old became superintendent of mining and metallurgical works at Espedal, Norway, and 10 years later returned to England as a member of the firm of Evans and Askins, Birmingham, nickel smelters In 1857–60 he traveled through Bolivia, Peru, and Chile in search of nickel and cobalt, later he explored the Cordilleras in South America and the South Sea Islands, and the year 1866 he spent in Europe and Africa He was foreign secretary of the Iron and Steel Institute, whose reports he published from 1871 to 1876 He is author of 58 papers, published chiefly in the *Geological Magazine*, the *Quarterly Journal of the Geological Society*, and the *Journal of the Chemical Society*

FORBES, DUNCAN, of Culloden (1685–1747). A Scottish judge and patriot, born Nov 10, 1685, probably at the family seat near Inverness He was educated at Inverness grammar school and after completing his studies at the universities of Edinburgh and Leyden became advocate at the Scottish bar in 1709 Through family influence he was soon appointed sheriff of Midlothian and rapidly acquired political power and a lucrative practice In 1722 he became member of Parliament for Inverness, in 1725 was appointed Lord Advocate, and in 1737 reached the summit of his profession as Lord President of the Court of Session His loyalty to the English crown had been conspicuous in the rebellion of 1715, and at the outbreak of 1745 he hastened north and by his presence and influence did much to counteract the uprising For advocating and exercising humanity towards the rebels he was accused as a suspect by Lord Lovat, who attacked Culloden House, his residence, but Lovat was spiritedly beaten off by the President and his people The rebellion spread, and Forbes fled for refuge to the Isle of Skye After the battle of Culloden he returned and zealously discharged his duties until he died, Dec 10, 1747 He was the author of some important theological works, and a *Treatise* on the dignities, etc, bestowed by English kings on their eldest sons Consult Duff, Memoir attached to the *Culloden Papers* (London, 1815), Bannatyne, Memoir attached to *Works of Duncan Forbes of Culloden* (Edinburgh, 1816), and Burton, *Lives of Simon, Lord Lovat, and Duncan Forbes of Culloden* (London, 1847)

FORBES, EDWARD (1815–54) An English zoologist He studied medicine and other sciences in Edinburgh and Paris and in 1841 became naturalist of the surveying ship *Beacon* during a voyage to Asia Minor In 1843 he became professor of botany at King's College, London, in 1852 professor of natural history at the School of Mines and president of the Geological Society, in 1853 professor at Edinburgh He was a brilliant and voluminous writer. Important among his works are *History of British Starfishes* (1841) and *History of British Mollusca* (with Hanley, 1853) Consult Wilson and Geikie, *Memoir of Edward Forbes* (Edinburgh, 1861)

FORBES, EDWIN (1839–95) An American animal and landscape painter and etcher He was born in New York, studied under A F Tait, and began as an animal and landscape painter During the Civil War he was special artist for *Frank Leslie's Magazine*, and the spirited etchings he did at this time were presented by General Sherman to the government They are now preserved in the War Office at Washington because of their historic value Afterward he painted landscape and cattle scenes, among which are "Orange County Pasture" (1879) and "Evening—Sheep Pasture" (1881) In 1877 he was made an honorary member of the London Etching Club

FORBES, GEORGE (1849–) A British electrician, son of James David Forbes the physicist He was educated at St Andrews and at Cambridge, became professor of natural philosophy at Anderson's College, Glasgow, and was electrical engineer for the power plant at Niagara Falls Among his published works are *Lectures on Electricity* (1888), *Alternating and Interrupted Electric Currents* (1895), *Elektrische Wechselstrome und unterbrochene Strome* (1896), *History of Astronomy* (1909), *Puppets A Workaday Philosophy* (1911)

FORBES, GEORGE, EARL OF GRANARD (1685–1765) See GRANARD

FORBES, HENRY OGG (1851–) A Scottish traveler, born at Drumblade In 1878–83 he made extensive scientific travels through Sumatra, Java, Timor, and other islands of the East Indies In 1885 and 1886 he explored British New Guinea He was elected a fellow of the Zoological Society of London and of the Royal Geographical Society and served as director of the Free Public Museums of Liverpool from 1894 to 1911 In 1911–13 he prepared a report on the birds of the Guano Islands for the government of Peru He published *A Naturalist's Wanderings in the Eastern Archipelago* (1885) and *Natural History of Sokotra* (1903).

FORBES, JAMES DAVID (1809–68) A Scottish physicist and geologist He was educated at the University of Edinburgh with a view to the law, but his natural inclinations led him to the study of physics At the age of 19 he was elected to membership in the Royal Society of Edinburgh and five years later succeeded Sir John Leslie as professor of natural philosophy in the university, although opposed by Sir David Brewster. His studies on thermal radiations resulted in the important discovery of the polarization of heat, for which the Royal Society of London awarded him the Rumford medal While traveling in the Alps, Forbes collected a vast amount of information bearing on the origin and movement of glaciers, and his book, which appeared in 1843, was the most valuable contribution on glacial phenomena that had been published up to that time His investigations were limited to the collection and arrangement of reliable data, but they were the means of overthrowing many crude conceptions and of directing future studies in the proper channels Forbes received the degree of LL D. from the University of Edinburgh and was elected to

membership in the Royal Society of London, the Geological Society, and many foreign scientific societies, including the Institute of France He contributed a great number of scientific papers to the *Proceedings* of the Royal Society of Edinburgh His more extended publications are *Travels through the Alps of Savoy and Other Parts of the Pennine Chain, with Observations on the Phenomena of Glaciers* (1843), *Norway, and Glaciers Visited in 1851* (1853), *A Tour of Mont Blanc and Monte Rosa* (1855)

FORBES, JOHN (1710–59) A Scottish soldier For some time he was a physician in Scotland, but he entered the army, served in the War of the Austrian Succession, became a colonel in 1757, and served for a time as quartermaster-general under the Duke of Cumberland In December, 1757, he was sent to America as adjutant general for service against the French and Indians, accompanied the Louisburg expedition early in 1758, and in the summer of that year led a force of 6000 to 7000 across Pennsylvania, and on November 25 took possession of Fort Duquesne, which had been evacuated by the French on the preceding day, and which he renamed Pittsburgh In March, 1759, Forbes, who had been dangerously ill through the expedition, died in Philadelphia Consult Parkman, *Montcalm and Wolfe* (Boston, 1884)

FORBES, SIR JOHN (1787–1861) A Scottish physician, born at Cuttlebrae, Banffshire He studied at Aberdeen from 1805 to 1807 and from the latter year to 1816 acted as assistant surgeon in the navy In 1817 he graduated in medicine at Edinburgh and practiced at Penzance and Chichester until 1840, when he removed to London He was physician to the Queen and Prince Consort, and was knighted in 1853 He was a fellow of the College of Physicians and the Royal Society of London, and a member of numerous foreign societies Jointly with Drs Tweedie and Conolly, he edited the *Cyclopædia of Practical Medicine* (4 vols, 1832–35). In 1836 he founded the *British and Foreign Medical Review*, which he carried on for 12 years. In 1831 he published the first edition of his translation of *Lænnec's Treatise on Auscultation* (5th ed, 1838) Among his other works are *Physician's Holiday* (1849), *Memoranda Made in Ireland* (1852) *Sightseeing in Germany and the Tyrol* (1856), *Nature and Art in the Cure of Diseases* (1857)

FORBES, JOHN COLIN (1846–) A Canadian portrait and landscape painter, born at Toronto He was already proficient in his art before he went to London, where he studied at the Royal Academy, South Kensington Museum, and afterward on the Continent He lived in New York City for several years, but in 1911 settled in London, England Among his works are the "Mount of the Holy Cross," "The Foundering of the *Hibernian*," "The Glacier of the Selkirk," and many portraits, including those of the Marquis of Dufferin, Gladstone, Sir Charles Tupper, Sir John A. Macdonald, Sir Henry Campbell-Bannerman, King Edward VII, and Queen Alexandra (Canadian Houses of Parliament, Ottawa)

FORBES, JOHN MURRAY (1807–85). An American clergyman He was born in New York and graduated at Columbia College in 1827 and at the General Theological Seminary in 1830 He was ordained to the Episcopal ministry in the same year and in 1834 became rector of St Luke's Church, New York, also acting for a time as professor of pastoral theology in the seminary In 1849 he became a Roman Catholic and after reordination was appointed pastor at St Ann's Church, New York He acted as theologian for the Bishop of Charleston in the council at Baltimore (1852) In 1859 he returned to the Episcopal church and from 1869 to 1872 was dean of the General Theological Seminary

FORBES, STANHOPE A (1857–) An Irish genre painter He was born in Dublin, studied at Dulwich College, the Lambeth Art School, the Royal Academy, and under Bonnat in Paris, and in 1889 received a first-class medal at the Paris Exposition After spending several years in Brittany, he took up his residence about 1884 in Cornwall, where he became the leader of the so-called Newlyn School of painters, who are distinguished by naturalism, broad brushwork, and sense of atmosphere Forbes is especially noted for his interior effects, which show much cleverness in the treatment of light His paintings usually treat of the simple life of the Cornish fishermen Among the best known are "The Health of the Bride" (Tate Gallery), "The Village Philharmonic Society" (Birmingham), "Off to the Fishing Ground" (Liverpool), "Sir Peter Code" (Norwich), "Mignon" (Sydney), "The Lighthouse" (Manchester); "Forging the Anchor" (1882), "The Pier Head" (1910), "The Old Pier Steps" (1911), and a decorative painting of "The Fire of London," in the London Stock Exchange Forbes was elected a correspondent of the French Institute in 1905, a Royal Academician in 1910, and received gold medals at Berlin, Munich, and Paris (1900) His wife, ELIZABETH ARMSTRONG FORBES, is also a distinguished painter and etcher Consult monograph by Hind (London, 1911)

FORBES, STEPHEN ALFRED (1844–) An American entomologist, born at Silver Creek, Ill, and educated at Rush Medical College, the Illinois State Normal University (where he taught zoology in 1875–78), and Indiana University (Ph D, 1884) As a youth, he had served in the Civil War He became prominently identified with scientific interests in Illinois, as curator for five years of the Museum of the State Natural History Society, founder (1877) and director of the State Laboratory of Natural History, State entomologist (after 1882) and director of the Illinois Biological Station (after 1894), and, at the University of Illinois, professor of zoology (1884–1909), dean of the college of science (1888–1905) and professor of entomology (after 1909) He organized the International Congress of Zoologists at the Chicago Exposition in 1893, was president of the Western Society of Naturalists in 1890 and of the American Association of Economic Entomologists in 1893 and 1908, and prepared numerous entomological reports and studies

FORBES, SIR WILLIAM, of Pitsligo (1739–1806) A Scottish banker and writer, born at Edinburgh and educated at Aberdeen In 1761, after being seven years in their employ, he was admitted as a partner in the bank at Edinburgh of Messrs John Coutts & Co, and two years later a new company was formed, of which he became the head in 1773 In 1781 he purchased the estate of Pitsligo, Aberdeenshire, which had been forfeited by Lord Forbes of Pitsligo for his part in the rebellion of 1745 He introduced the most extensive improvements on it and laid

out and built the village of New Pitsligo He was a member, with Johnson, Burke, Garrick, Reynolds, and others, of the celebrated Literary Club of London, was a friend of Dr Beattie the poet, and published *An Account of the Life and Writings of James Beattie* (2 vols, 1806) He also wrote *Memoirs of a Banking House* (1803). His bank became, in 1838, the Union Bank of Scotland

FORBES, W(illiam) Cameron (1870–) An American public official, born at Milton, Mass Graduating from Harvard University in 1892, he was for a time a clerk in a Boston banking house, from 1897 to 1902 had charge of the financial department of the engineering firm of Stone and Webster, and after 1899 was a partner of J M Forbes & Co, bankers, Boston In the government of the Philippine Islands he was a member of the Philippine Commission and secretary of commerce and police from 1904 to 1908, Vice Governor in 1908–09, and Governor-General from 1909 to 1913, when he was succeeded by Francis Burton Harrison (q v)

FORBES QUARRY See Man, Ancient Types of

FORBES-ROB'ERTSON, Sir Johnston (1853–) An English actor, born in London He early won some success as a painter, but went upon the stage when he was 21 years old, and was thereafter a member of various companies, including those of Sir Henry Irving and Sir Squire Bancroft In 1895 he appeared with Mrs Patrick Campbell in the first production of *The Notorious Mrs Ebbsmith*, playing the part of Lucas Cleeve The same year he made his first venture in London management, opening with *Romeo and Juliet*, in which he and Mrs Campbell played the title rôles Three years later he followed this with *Othello* and *Hamlet*, and scored the greatest success of his career in the latter In 1898 he took his company to Berlin, where he appeared successfully in *The Second Mrs Tanqueray*, *Macbeth*, and *Hamlet* His first appearance in America was in 1885 as Orlando He returned in 1906 and produced Shaw's *Cæsar and Cleopatra*, and again in 1909, when he appeared in *The Passing of the Third Floor Back*, which ran through the entire seasons of 1909–10 and 1910–11 In 1912 he began a farewell tour of the English provinces, appearing in a repertoire of his former successes He extended this to include America, where he appeared with Gertrude Elliott, his wife, during the season of 1913–14 He was knighted at the termination of his farewell season at Drury Lane in 1913 He came to be regarded as one of the most distinguished actors of his time Consult William Winter, *The Wallet of Time* (2 vols, New York, 1913)

FORBIDDEN FRUIT A name fancifully given to the fruit of different species of the genus *Citrus* In the shops of Great Britain, a small variety of the shaddock (*Citrus decumana*) generally receives this name, but on the continent of Europe a different fruit, regarded by some as a variety of the orange and by some as a distinct species (*Citrus limetta*), is known as the forbidden fruit, or Adam's apple The name "forbidden fruit" has also been given to the fruit of *Tabermemontana dichotoma*, a tree of Ceylon, of the family Apocynaceæ The shape of the fruit, which is a follicle, containing pulp, suggests the idea of a piece having been bitten off, and the legend runs that it was good before Eve ate of it, although it has been poisonous ever since See Pomelo, Shaddock, Citrus

FORBIGER, fôr'big-ĕr, Albert (1798–1878) A German classical scholar, born in Leipzig He studied at the University of Leipzig, in 1824 was appointed an instructor in the Nikolaischule in Leipzig, and in 1835 became its associate rector From 1863 to his death he was at Dresden His publications include an edition of *Vergil* (4th ed, 1872–75), *Handbuch der alten Geographie* (1842–43), a translation into German of Strabo (1856–62), *Hellas und Rom* (1871–82), with A Winckler Consult Sandys, *A History of Classical Scholarship*, vol iii (Cambridge, 1908)

FORBIN, fôr'băn', Claude, Count de (1656–1733) A French mariner, born at Gardanne (Provence) After a wild boyhood he entered the navy and distinguished himself by reckless bravery in the campaigns of Messina (1675), the Antilles (1680), and Algeria (1682–83) He was sent to Siam as Ambassador in 1685 and so pleased the King of that country that he made him his grand admiral In 1688 Forbin returned to France and under Jean Bart fought against England and was taken prisoner From 1690 to 1707 Forbin was very active He fought at La Hogue and Lagos and at the taking of Barcelona and captured numerous English and Dutch vessels as commander of the French fleet in 1706–08 In 1708 he commanded the expedition to conduct the Pretender to Scotland, but failed, as the coast was too well guarded In 1710 he retired from active life and lived at Marseilles, where he wrote his entertaining *Mémoires*, which were edited by Reboulet and first published in 1729 Consult the biography by Richer, 4th ed (Paris, 1816)

FORBONNAIS, fôr'bŏ-nā', François Véron Duverger de (1722–1800) A French political economist, born at Le Mans (Sarthe) After study of business methods at Nantes, and travel in Italy and Spain, he became inspector general of the Mint in 1756, and in 1759 the head of the office of Silhouette, Comptroller General of the Finances In 1763 he was forced to retire His advice was frequently sought by the Constituent Assembly of 1790, in the reform of the monetary system He was elected a member of the Institute of France in 1794 He wrote extensively on economic questions, contributing to the *Encyclopédie* the article "Commerce" and opposing the physiocrats, especially Quesnay He possessed judgment of a high order and clear style, and his works influenced the administration of his day and are still valuable These include *Eléments du commerce* (2 vols, 1754), *Recherches et considérations sur les finances de France depuis 1595 jusqu'en 1721* (1758), *Principes et observations économiques* (1767), *Analyse des principes sur la circulation des denrées* (1800) Consult Delisle de Sales, *Vie littéraire de Forbonnais* (Paris, 1801)

FORCADOS, fôr-ka'dŏs A town and port of call on the delta of the river Niger in south Nigeria It is built on land which has been reclaimed from the river and is the centre of a large project for reclamation and sanitation Pop, about 3000

FORCE (Fr *force*, OSp, It *forza*, from ML *fortia*, force, from Lat *fortis*, strong, connected with Skt *brhan*, high) If the motion of a body is observed to be changing, i e, if it is observed to have an acceleration (q v), it is said to be

under the "action of a force" As illustrations, changes in motion are observed if a heavy body is allowed to drop from the hand, if a piece of iron is brought near a magnet, if a piece of paper or dust is brought near an electrified body, etc , and therefore one speaks of the "force of gravitation," "magnetic force," "electric force," etc In every case, however, when there is a change in the motion of a body, it may be shown that this change is in some way due to the presence of some other body, e g , the earth, the magnet, the charged body, and it is shown in mechanics (q v) that the proper measure of this influence on the body which receives the acceleration is the product of the numerical value of its mass and the numerical value of the acceleration received Thus, if a body whose mass is m grams is moving with an acceleration a (measured in centimeters and seconds), an "external force" of ma dynes is said to be "acting on it," since in the C G S system the dyne is the unit of force This acceleration may, of course, be due to the simultaneous "action" of several forces, each of which by itself would have produced a different acceleration. In particular, if there is no acceleration, this does not necessarily mean an absence of external action, but may mean that there are two forces acting in opposite directions which are numerically equal There are two general methods for measuring forces one is to measure the mass and the acceleration, the other is to balance the force by one whose value is known Thus, as all bodies fall towards the earth at any one place on the earth with the same acceleration when allowed to fall *freely*, viz , with an acceleration which may be called g and which nearly equals 980, the force of the earth on a body, whose mass is m grams, i e , its "weight," is mg Consequently, if this body is kept from falling by being suspended by a cord, the cord must exert on the body an *upward* force whose numerical value is mg If, therefore, it is required to apply a force F in a particular direction, it is simply necessary to attach a body whose mass m equals F/g to one end of a cord, pass the cord over a pulley (q v), and attach its other end to the body on which the force F is to act, in such a manner that the cord pulls in the specific direction Similarly, if any force can be neutralized by the weight of a body of mass m, this force must have the numerical value mg dynes In this way "magnetic" or "electric" forces can be measured

The "field of force" of a body is the region through which it is possible to detect the action of forces on other bodies due to its presence. Thus, the field of force of gravitation of the earth extends far beyond the moon out into celestial space, the field of magnetic force of the earth also extends far out into space—how far, it is not known, the field of electric force due to a charged body is in general a limited region quite near it The "direction of the field" at any point is that in which a specific particle of matter placed at that point would move under the action of the given kind of force if allowed to move freely. Thus, the direction of the field of gravitational force around the earth is always vertically towards the centre of the earth, the direction of a magnetic field of force is that in which the north pole of a minute magnet would move, the direction of an electric field of force is that in which a particle of matter positively charged would move The subject of force plays an important part in all conditions involving physical measurements The student of physics is referred to one of the modern treatises on physics Consult Everett, *Centimetre-Gramme-Second System* (London, 1902), Hertz, *Principles of Mechanics* (ib , 1899), F Soddy, *Matter and Energy* (ib , 1912), J Weir, *Energy System of Matter* (ib , 1912), W Ostwald, *Die Energie* (2d ed , Leipzig, 1912), A H Gibson, *Natural Sources of Energy* (New York, 1913)

FORCE, LA See LA FORCE

FORCE, MANNING FERGUSON (1824–99). An American soldier, writer, and lawyer, the son of Peter Force (q v) He was born in Washington, D C , and graduated at Harvard College in 1845 and at the Harvard Law School in 1848 On the outbreak of the Civil War he entered the Federal army as major of the Twentieth Ohio Volunteers, at the close of the war was brevetted major general of volunteers Refusing a colonelcy in the regular army, he resigned from the service, practiced law, and was judge of the Court of Common Pleas of Hamilton Co , Ohio (1867–77), judge of the Superior Court of Cincinnati (1877–87), and commandant for many years of the Ohio Soldiers' Home He published *Prehistoric Man* (1873), *To What Race did the Moundbuilders Belong?* (1879), *From Fort Henry to Corinth* (1881), *Marching across Carolina* (1883), *Personal Recollections of the Vicksburg Campaign* (1885), *Life of Justice John McLean* (1885), a biography of Gen W T Sherman (1899) He edited Walker's *Introduction to American Law* (1878) and Harris's *Principles of Criminal Law* (1880)

FORCE, PETER (1790–1868). An American scholar and historian, born near Passaic Falls, N J He became a printer, served in the War of 1812, went to Washington in 1815, and in 1820–36 published the *National Calendar*, a statistical annual From 1823 to 1830 he was proprietor and editor of the *National Journal*, a semiweekly which became a daily in 1824 He was mayor of the city of Washington in 1836–40 and in the latter year was elected the first president of the National Institute for the Promotion of Science In 1836–46 he published *Tracts and Other Papers Relating principally to the Origin, Settlement, and Progress of the Colonies in North America, from the Discovery of the Country to the Year 1776* (4 vols) But he is best known for his *American Archives*, a documentary history of the English colonies in North America, edited by him and Matthew St Clair Clarke, and published at the expense of the government under an Act of Congress of 1833. Nine volumes, covering the period from 1765 to 1776, appeared in 1837–53, but the work was then discontinued because Marcy, Secretary of State, refused to approve further volumes Force's unique library, including 30,000 pamphlets and more than 20,000 volumes and consisting principally of Americana, of which he was the earliest important collector, was purchased by the government in 1867 for $100,000 and incorporated with the Library of Congress. Force was also an authority on the literature of Arctic discovery and wrote *Grinnell Land* (1852)

FORCE BILL. In American political history, the name applied to several bills passed by the United States Congress. (See NULLIFICATION, RECONSTRUCTION, KU-KLUX KLAN.) The Force Bill of 1890 was introduced to the House by Representative Lodge, of Massachusetts. It provided that on petition of 500 voters in any

local district Federal officials of both parties be appointed on election boards The bill was aimed at the Southern States, where the negro had been illegally excluded from the polls It aroused a storm, and though it passed the House never came to a vote in the Senate

FORCE DE CHEVAL, fôrs de she-val′ (Fr, horse power) A French unit of power, also known as *cheval-vapeur*, equal to 736 watts (q v), and corresponding to the English "horse power," which is equivalent to 746 watts. It is the rate of work or activity equivalent to 75 kilogrammeters per second See MECHANICAL UNITS

FORCED MARRIAGE, THE A tragicomedy by Mrs Aphra Behn, produced at the Duke's Theatre in 1671

FORCELLINI, fôr′chĕl-lē′nē, EGIDIO (1688–1768) An Italian philologist He was born in a village near Padua Owing to the limited means of his family, Forcellini was deprived of early instruction and was already verging towards manhood when enabled to commence a regular course of study in the seminary at Padua His ability and industry won the admiration of the principal, Giacomo Facciolati (q v), who associated him with some of his own scientific labors Forcellini's main life-work was the compilation of a highly important lexicon (For the correct account of the preparation of this work, one of the most valuable acquisitions to philological science of the age, see FACCIOLATI) In addition to the Italian and Greek signification of the Latin word, the literal and figurative application of each expression is given in a collection of examples, embracing the customs, laws, arts, sciences, religion, and history of the Romans

FOR′CEPS (Lat, pincers) An instrument of great antiquity, used as a substitute for the fingers, and consisting of two levers of metal jointed together crosswise, usually nearer to one end than the other The hand grasping the longer ends of the levers, or handles, closes the shorter ends, which are shaped so as to seize firmly the intended object There is scarcely a surgical operation in which it is not applied The variety is almost innumerable In addition to the forms used in dentistry there are in common use the *dissecting* forceps, which has roughened points, to lay hold of small portions of tissue which are to be divided by the knife, the *lithotomy* forceps, which has blades concave like spoons, while other forms of this forceps are adapted for seizing stones of various shapes and sizes, and *artery* forceps, with locks for seizing and holding the extremities of bleeding vessels By means of Liston's *cutting* forceps, a powerful hand can divide a great thickness of bone One of the most important of all forceps is the *obstetric* forceps, an invaluable invention in cases of difficult delivery It consists of two concave fenestrated blades, forming a cavity into which the head of the child fits The blades are applied separately, one to each side of the head, and then locked together Holding by the handles, the accoucheur aids the natural efforts of labor. The instrument does not necessarily or generally injure either mother or child

FORCHHAMMER, fôrk′ham-mĕr, JOHANN GEORG (1794–1865) A Danish geologist He was born in Husum, Schleswig, studied at Kiel and Copenhagen, and was associated with Oersted and Esmarch in a mineralogical exploration of Bornholm In 1823 he became lecturer on chemistry and mineralogy in Copenhagen University, in 1831 professor of mineralogy, and in 1848 curator of the geological museum He succeeded Oersted in 1851 as director of the Polytechnic School and secretary of the Academy of Sciences His researches (jointly with Steenstrup and Worsaae) on the prehistoric anthropology of the north of Europe have yielded results of great importance Among his publications are *Krystallographie* (1833), *Danmarks geognostiske Forhold* (1835), *Bidrag til Skildringen of Danmarks geographiske Forhold* (1837)

FORCHHAMMER, PETER WILHELM (1801–94) A German classical archæologist and mythologist, brother of Johann Georg Forchhammer He was born at Husum, Schleswig, and studied at the University of Kiel, where he became professor extraordinary in 1836 In 1830–34 he visited Italy and Greece and in 1838–40 undertook a second journey to Greece, Asia Minor, Egypt, and Rome, which bore fruit in valuable contributions to the topography of ancient Hellas and the Greek settlements in Asia Among these works were *Hellenika* (1837) and *Ueber die Reinheit der Baukunst* (1856), in which he traced the four styles of Greek architecture to climatic conditions and differences in materials He also wrote treatises on the philosophy of Aristotle and on the archæology and mythology of Greece In his works on the latter subject he invariably regarded the Hellenic myths as personified embodiments of natural, and especially aquatic, phenomena, he held that the Greeks had converted the annually recurring processes of nature into acts of heroes and gods Among these publications mention should be made of his *Achill* (1853), in which he explained the Trojan War as based ultimately on the conflict of the elements in the winter season in the Troad, *Daduchos* (1875), *Die Wanderungen der Inachostochter Io* (1881), *Erklarung der Ilias auf Grund der topischen und physischen Eigentumlichkeiten der troischen Ebene* (1884), *Prolegomena zur Mythologie als Wissenschaft und Lexikon der Mythensprache* (1891), *Homer Seine Sprache, die Kampfplatze seiner Heroen und Gotter in der Troas* (1893) His early work, *Die Athener und Sokrates* (1837), contained many original ideas that were at first ridiculed, but were afterward accepted by prominent historians On topography he wrote also *Topographie von Athen* (1841) and *Beschreibung der Ebene von Troja* (1850) Forchhammer sat in the Prussian Diet from 1868 to 1870 and from 1871 to 1873 was a member of the German Reichstag Consult Alberti, in Bursian's *Biographisches Jahrbuch fur Altertumskunde*, vol xx (Berlin, 1897)

FORCHHEIM, fôrk′hīm A town in Upper Franconia, Bavaria, near the junction of the Wiesent with the Regnitz, on the Ludwigskanal, 16 miles south-southeast of Bamberg It has a castle and the Gothic Collegiate Church, with paintings by Michael Wohlgemut and sculpture by Veit Stasz Its manufactured products include machinery, cloth, textiles, optical and leather goods, tinfoil, water and oil colors, fertilizer, glue, beer, and paper Forchheim was an important town in the days of Charlemagne and in the ninth and tenth centuries was the meeting place of many royal diets From 1007 to 1802 it was held by the bishops of Bamberg, except during an interval of about 30 years In its vicinity the French, on Aug 7, 1796, gained

a victory over the Austrians Pop, 1910, 9150

FOR'CIBLE ENTRY AND DETAINER. The taking and keeping possession of real property through threats or force, without authority of law To make an entry forcible and, as such, unlawful, there must be such acts of violence or menaces as may give reason to anticipate personal injury or danger in making a defense But the force must be more than is implied in mere trespass There are in most of the States statutes regulating proceedings in cases of forcible entry, directing the manner of proceeding for the restoration of property unlawfully withheld and the punishment of the offender The plea of ownership is not a justification for the use of force in recovering property, for no one may enter even upon his own property in any other than a peaceable manner Nor can the owner be excused on the plea that he entered to enforce a lawful claim or make a distress The policy of this legislation is to prevent the disturbance of the public peace and to compel disputants to settle their controversies in a court of justice

Originally by the common law of England the right of entry upon land of which one had been unlawfully deprived might be exercised by force if necessary But by a series of early statutes, the first of which dates back to the time of Richard II (5 Rich II, c 7, 1381), this remedy was limited to an entry in peaceable and easy manner, and not with force or strong hand See ENTRY, RIGHT OF

FORCING, IN HORTICULTURE The acceleration of vegetation by application of artificial heat. The term is not usually applied to the cultivation of exotic plants in hothouses, where the object is to imitate as much as possible their native climate, but it is strictly applicable to the system usually pursued with various flowers, grapes, pineapples, tomatoes, and other plants, to secure the production of bloom and fruit at desired seasons, and by different plants of the same kind in succession through a considerable period, the heat being increased for one set of plants sooner than for another. Many of the fruits and vegetables which grow well in the open air are very commonly forced, in order that they may be procured out of their natural season Thus, rhubarb is forced by means of the heat produced by heaps of fermenting manure Asparagus, salads, radishes, lettuce, onions, etc, are often forced by means of hotbeds, or in flued pits, or a place is found for them in hothouses Strawberries are treated in the same way See HOTBED, HOTHOUSE

FOR'CITE See EXPLOSIVES

FORCKENBECK, fôrk'en-bĕk, MAX VON (1821–92) A German Liberal politician, born at Munster, Westphalia In 1858 he was elected to the Prussian House of Representatives, in 1862 he founded the Fortschrittspartei, or Party of Progress, and in 1866 the National Liberal party He was elected president of the House in 1866 From 1867 until his death, except for the years 1887–90, he was a member of the Reichstag, and from 1874 to 1879 its president He sat in the Prussian House of Peers from 1873, as chief burgomaster of Breslau, and from 1878 until his death he was chief burgomaster of Berlin, but he took little part in politics after the downfall of the National Liberal party In 1877 Bennigsen refused Bismarck's offer of a portfolio because he would not give a portfolio to Forckenbeck The latter broke with Bennigsen in 1880 and with Bamberger and Stauffenberg formed the Liberal Union (Liberal Vereinigung). In 1884 he joined the Deutschfreisinnige party Consult the biography by Philippson (Dresden, 1898)

FORD, EDWARD ONSLOW (1852–1901). An English sculptor He was born in London and studied painting at the Antwerp Academy and sculpture at the Munich Academy under Wagmuller He became an associate of the Royal Academy in 1888 and a Royal Academician in 1895 He was also elected a corresponding member of the Institute of France He is best known for his portrait statues and busts which are delicately modeled and truthful likenesses Among the best of his busts are those of Herkomer, Millais (National Portrait Gallery, London), Alma-Tadema, Dagnan-Bouveret, Briton Rivière, and Sir Frederick Bramwell (Royal Institution, London) His best statues include those of Sir Rowland Hill (1882), at the Royal Exchange, Gladstone (1894), at the city Liberal Club, London, Sir Henry Irving as Hamlet (1883, Guildhall Art Gallery, London), C G Gordon ("Chinese" Gordon) (1890), at Chatham and Khartum, the Marlowe Memorial at Canterbury, the Shelley Memorial at University College, Oxford, a statue of Huxley (1900), at the British Museum of Natural History, the equestrian statues of Lord Strathnairn at Knightsbridge, the Maharajah of Mysore (1898), and the colossal statue of Queen Victoria at Manchester (1901) He also modeled many dainty nude statuettes, such as "Folly" and "The Singer," in the Tate Gallery, "Peace" (1890), "Echo" (1895), "Glory to the Dead" (1901). Ford possessed a strong feeling for the beautiful and the picturesque, his treatment is realistic, but the sculptural effect of some of his finest works is marred by excess of decorative detail Consult Spielmann, *British Sculpture and Sculptors of To-Day* (London, 1901)

FORD, EMANUEL (fl. 1607) An Elizabethan romancer He was the author of *Parismus*, in two parts (1598–99), long exceedingly popular, and of the similar romances, *Ornatus and Artesia* (1607) and *Montelion* (1633, but probably published earlier)

FORD, SIR FRANCIS CLARE (1828–99). An English diplomat, son of Richard Ford He was commissioned a lieutenant in the Fourth Light Dragoons, but left the army in 1851, entered the diplomatic service, and became Secretary of Legation at Washington, where he was acting chargé d'affaires in 1867–68. In 1871 he was appointed Secretary of Embassy at St Petersburg and in 1872 was transferred to Vienna He represented the British government in 1897 at Halifax before the International Commission, by decision of which $5,500,000 was awarded to Great Britain for superior advantages obtained by the United States in the Washington fisheries treaty of 1871 In 1878–79 he was United States Minister to the Argentine Republic and during a portion of the time to Uruguay also. He was afterward appointed to similar posts at Rio de Janeiro and at Athens, in 1884 became Minister (from 1887 Ambassador) to Spain, in 1884–85 was commissioner to settle the Newfoundland fisheries question, in 1892 was transferred to Constantinople and in 1893 to Rome His services to British diplomacy won for him frequent official recognition, including appointment to the Privy Council in 1888.

FORD, HENRY (1863–) An American automobile manufacturer He was born at Greenfield, Mich, where he was educated in the district schools He learned the machinist's trade and after 1887 lived in Detroit For a time he was chief engineer of the Edison Illuminating Company In 1903 he organized the Ford Motor Company, of which he became president This corporation is the largest manufactory of automobiles in the world, it employs 16,000 men and has turned out about 1000 automobiles in a day, a specialty being made of low-priced cars In January, 1914, Ford attracted national attention by his announcement of a profit-sharing plan involving the distribution of $10,000,000 annually to his employees See PROFIT-SHARING

FORD, HENRY JONES (1851–1925) An American journalist and professor of politics He was born at Baltimore, Md, and graduated from the Baltimore City College in 1868 He was editorial writer in 1872 and managing editor in 1875–79 of the Baltimore *American*, served for a time as city editor and in 1883–85 as staff member of the Baltimore *Sun*, held the managing editorship of the Pittsburgh *Commercial Gazette* from 1885 to 1895 and of the Pittsburgh *Chronicle Telegraph* from 1895 to 1901, and was editor of the Pittsburgh *Gazette* in 1901–05 He lectured on political science at Johns Hopkins University in 1906 and 1907, and in 1908 became professor of politics at Princeton University Besides special articles on political science, Ford is author of *The Rise and Growth of American Politics* (1898) and *The Cost of our National Government* (1910)

FORD, JAMES LAUREN (1854–). An American humorist He was born at St Louis, Mo, and received an academic education at Stockbridge, Mass, but moved early to New York, where he held many editorial positions on newspapers and periodicals, either as editor, dramatic critic, literary critic, or as a special writer He devoted much of his time to dramatic work and is the author or adapter of two successful plays His humorous writings are, for the most part, in the form of satirical comments on current tendencies and affectations in American literature, drama, and life His writings include *The Literary Shop and Other Tales* (1894, 3d ed, 1899), *Hypnotic Tales* (1894), *The Third Alarm* (1893, new ed, 1908), *Bohemia Invaded* (1895); *Dr Dodd's School, Dolly Dillenbeck* (1895), *Cupid and the Footlights* (1899), *The Story of Du Barry* (1902), *The Brazen Calf* (1903), *The Wooing of Folly* (1906) He also edited, with Mary K. Ford, *Every Day in the Year* (1902, new ed, 1914)

FORD, JEREMIAH DENIS MATHIAS (1873–) An American professor of Romance languages He was born at Cambridge, Mass, graduated (1894, Ph D, 1897) from Harvard University, and studied also in various French schools At Harvard he was instructor, assistant professor, and, after 1907, professor of the French and Spanish languages In 1910–11 he was vice president of the Modern Language Association He edited Goldoni's *Curioso Accidente* (1899), Moratin's *Sí de las niñas* (1899), Alarcón's *Capitán Veneno* (1900), *A Spanish Anthology* (1901), *The Romance of Chivalry in Italian Verse* (1904, 2d ed, 1906), *Old Spanish Readings* (1906, new enlarged ed, 1911), *Selections from Don Quijote* (1908), and published *The Old Spanish Sibilants* (1900), *Exercises in Spanish Composition* (1901), *Spanish Grammar* (1904). Ford was a contributor to the NEW INTERNATIONAL ENCYCLOPÆDIA

FORD, JOHN (fl 1639). An English dramatist of good county family and singular among his contemporary playwrights in not being dependent upon his pen for his support He matriculated at Exeter College, Oxford—no university record of him remains, however—and became a bencher of the Middle Temple in November, 1602 His first publication was *Fame's Memorial* (1606), an elegy on the Earl of Devonshire In 1606 also appeared *Honor Triumphant* and *The Monarches Meeting*, which present him in the light of one ready to use his pen for the entertainment of the court *An Ill Beginning Has Good End*, which has been attributed to Ford, was played at the Cockpit in 1613 If this attribution be correct, it marks the beginning of his dramatic career In collaboration with Dekker he wrote *The Fairy Knight* and *The Bristowe Merchant* (both licensed in 1624, but neither of them published), in collaboration with Webster, *A Late Murther of the Son upon the Mother* (licensed 1624), in collaboration, probably with Dekker and others, *The Sun's Darling* (acted 1624, printed 1657), and in collaboration with Dekker and Rowley, *The Witch of Edmonton* (acted probably c 1621, but printed 1658) Of the plays by Ford alone, *The Fancies, Chaste and Noble* (acted 1636, printed 1638) and *The Lady's Trial* (acted 1638, printed 1639) are by general consent dramatically failures, and his reputation rests mainly upon *'Tis Pity She's a Whore* (acted c 1626), a tragedy of extraordinary power, dealing with the passion of a brother for a sister; (translated into French by Maeterlinck in 1894 and played in that year in Paris under the title *Annabella*), *The Lover's Melancholy* (acted 1628, printed 1629), impressive by the depth of its pathos, but weak in its comic scenes, *The Broken Heart* (acted c 1629), as good as anything of this author's, unless *'Tis Pity She's a Whore* be given first place, and notable among his plays for its skillful construction, for its comparative freedom from the morbidity of theme to which he was prone, for its tragic intensity, and for various other excellences, both major and minor, and *Perkin Warbeck* (printed 1634, probably acted 1635), an historical drama, which Hartley Coleridge doubtless overpraised in declaring it the best historical play outside of Shakespeare's national histories, but which still ranks high among its contemporaries of the same kind Regarding Ford's place as a dramatist, Lamb declared in effect that Ford was of the first order of dramatic poets, and Swinburne, in one of his essays, has gone almost an equal length in the way of praise On the other hand, Hazlitt regards the weakness of his comic vein, his extravagance, and "a certain perversity of spirit" as sufficient seriously to mar his fame Though Ford lacks the magic of verse and phrase that distinguish the greatest of his contemporaries, his blank verse is still at its best a noble medium of music and expression, and this, together with the dramatic beauty and intensity of scenes and passages scattered through his plays, gives him a secure place in the great succession of Elizabethan dramatists The best edition of Ford is that of Gifford, revised by Dyce, which contains a memoir (1869) Consult also *Dramatic Works of Massinger and Ford* (1840, 1883),

with introduction by Hartley Coleridge, *Best Plays of Ford* ("Mermaid Series," 1888, 1903), ed by Havelock Ellis, Emil Koeppel, *Quellen Studien* (Strassburg, 1897), W Bang, *Materialen zur Kunde des alteren englischen Dramas*, vol xiii (Leipzig, 1906)

FORD, JOHN DONALDSON (1840–1918) An American naval officer, born at Baltimore, Md He graduated from the Maryland Institute School of Design in 1861 and from the Potts School of Mechanical Engineering in 1862 Entering the navy as third assistant engineer, he was at Baton Rouge, La (1863), Mobile Bay (1864), and on the ill-fated *Arizona* (1865) In 1867 he was wrecked in the *Sacramento* on the Coromandel coast of India He was detached from regular service in 1884 to organize the Baltimore Manual Training School In 1894–96 he taught at the Maryland Agricultural and Mechanical College, and in 1898, becoming fleet engineer of the Pacific station, was with the Asiatic fleet during the Spanish-American War In 1902 he was promoted captain and later in the same year was retired with the rank of rear admiral, but continued to serve as inspector of ordnance and machinery until 1908 He published pamphlets on manual training in public schools, professional papers, and *An American Cruiser in the East* (1898)

FORD, JOHN THOMSON (1829–94) An American theatrical manager, born at Baltimore He became manager of the Holliday Street Theatre in Baltimore, where he was elected president of the municipal council (1858) and was acting mayor for two years In Washington, D C, he built three theatres, one of which was that known as Ford's Theatre, the scene of the assassination of President Lincoln by Booth on April 14, 1865 On suspicion of complicity, he was arrested, but after 40 days' imprisonment was released, as no evidence was adduced against him In 1871 he built Ford's Grand Opera House at Baltimore

FORD, PAUL LEICESTER (1865–1902) An American historian and novelist, born in Brooklyn, N Y He was privately educated, and after wide travels in both hemispheres he devoted himself to investigations in the sources of American history and edited the *Writings of Thomas Jefferson* (10 vols, 1892), the *Writings of John Dickinson* (2 vols, 1893), *The Federalist* (1886), etc These studies led to *The True George Washington* (1896), *The Many-Sided Franklin* (1899), and *The New England Primer*, with many minor writings of like character. To fiction he contributed *The Honorable Peter Sterling* (1894), *The Great K & A Train Robbery* (1897), *The Story of an Untold Love* (1897), *Tattle Tales of Cupid* (1898), *Janice Meredith* (1899), *Wanted A Matchmaker* (1901); *Wanted A Chaperon* (1902) Mr Ford also did valuable work in the *Bibliographer*, which he founded, and of which he was editor at the time of his death

FORD, RICHARD (1796–1858). An English writer He graduated at Trinity College, Oxford, in 1817, and was afterward called to the bar, but never practiced He spent four years traveling in Spain and in 1845 published his delightful *Handbook for Travelers in Spain*, in two volumes A second edition (1847) was in one volume, and the material left out was published in *Gatherings from Spain* (1846) Ford also contributed important papers on Spanish art to the *Quarterly Review* and other periodicals He wrote letterpress for several art works, notably the *Tauromachia* (1852) of Lake Price

FORD, SIMEON (1855–) An American hotel proprietor, born at Lafayette, Ind, and educated in the public schools For many years he was proprietor of the Grand Union Hotel, New York City—until it was closed in 1914 He became a member of the firm of Ford & Shaw, president of the Official Hotel Red Book and Directory Company, of the Rye Land and Improvement Company, and of the Zeeland Realty Company, and director in various corporations Widely known for his after-dinner speeches, he published some of these, together with addresses, as *A Few Remarks* (1903)

FORD, WILLIAM WEBBER (1871–) An American bacteriologist He was born at Norwalk, Ohio, and graduated from Western Reserve University in 1893 and from Johns Hopkins University (M D) in 1898 He was also a fellow of McGill University (1899–1901) and of the Rockefeller Institute, New York City (1901–02) At Johns Hopkins he was instructor (1903–05), associate (1905–06), and associate professor of bacteriology and hygiene and lecturer on legal medicine (after 1906) He became a member of several scientific and professional societies He is author of papers on intestinal bacteria, diseases of the liver, toxins and antitoxins, water supplies, milk, sewage, and typhoid fever

FORD, WORTHINGTON CHAUNCEY (1858–) An American author and statistician, born and educated in Brooklyn, N Y He was, from 1885 to 1889, chief of the Bureau of Statistics of the Department of State in Washington, from 1893 to 1898 chief statistician of the Treasury Department, and from 1902 to 1909 chief of the division of manuscripts in the Library of Congress In 1909 he became editor of the publications of the Massachusetts Historical Society and in 1910 lecturer at Harvard He wrote *The American Citizen's Manual* (1883), *The Standard Silver Dollar* (1884), *George Washington* (1899, rev ed, 1910), and numerous monographs on historical, biographical, and economic subjects He revised David A Wells's *Natural Philosophy* (1879), and edited the *Correspondence and Journals of Samuel Blachley Webb* (1893–94), *The Writings of George Washington* (1889–91); the *Journals of the Continental Congress*, *Bibliography of the Massachusetts House Journals, 1715–76* (1905), *John Quincy Adams* (1902), *List of B Franklin's Papers in the Library of Congress* (1905), *Writings of John Quincy Adams* (3 vols, 1913)

FORD CITY A borough in Armstrong Co, Pa, 40 miles northeast of Pittsburgh, on the Pennsylvania Railroad, and on the Allegheny River (Map Pennsylvania, C 5) It is in an agricultural and coal-mining region and has manufactories of plate glass The water works and electric-light plant are owned by the city Pop, 1900, 2870, 1910, 4850

FORD'HAM. Formerly a village in Westchester Co, N Y, situated on the east bank of the Harlem River (Map Greater New York, E 3), but since 1898 included in the city of Greater New York The first permanent settlement in this vicinity was made in 1671 by a Dutchman named Jan Arca, who bought the tract from Andrian Van der Donck and the Indians Fordham University (q v) was founded here in 1841 as St John's College. There is

also the cottage in which Edgar Allan Poe lived from 1844 to 1849

FORDHAM UNIVERSITY, formerly ST JOHN'S COLLEGE A Roman Catholic institution, directed by the Fathers of the Society of Jesus in Bronx Borough, New York City, adjoining Bronx Park and the Botanical Gardens which were formed in part out of land formerly belonging to the college St John's College was begun as the New York Diocesan College and Seminary by Archbishop Hughes in 1839 He purchased for that purpose, in the village of Fordham, for $30,000, the old Rose Hill manor house and 98 acres of land Tradition says that this was where Cooper found the scene for his novel *The Spy* St John's College was opened with six students, June 24, 1841 The Rev John McCluskey (afterward the first American Cardinal) was its president, and its faculty was secular priests and lay instructors The ecclesiastical part or seminary was called St Joseph's and was in charge of Italian Lazarists, with the Rev Dr Felix Villanis at its head It had 14 students After several years of this secular administration Archbishop Hughes invited the Jesuits to take charge, and a number of the order came to New York from St Mary's, Washington (now Marion) Co, Ky, for that purpose The Rev Augustus J Thébaud was the first rector of both college and seminary The New York Legislature granted the college its charter to give degrees in theology, arts, law, and medicine, April 10, 1846 In 1856 Archbishop Hughes resumed direct control of St Joseph's Seminary and returned its management to secular priests It was moved to Troy and opened there Oct 18, 1864 In 1896 it was moved to its present location, Dunwoodie, Westchester County On June 21, 1904, the board of trustees of St John's authorized the opening of law and medical departments in addition to the Arts course and on March 7, 1907, the charter was amended by the regents of the State University to formally establish this, and allow St John's College to change its corporate name to Fordham University In 1912 a College of Pharmacy was opened The grounds cover 70 acres, upon which are erected 10 buildings for the use of the faculty and students In 1914 the number of students at the university was 1500 There were 140 professors and instructors, and the library contained 60,000 volumes The president in 1914 was Thomas J McCluskey, S J Consult T G Taafe, *History of St John's College, Fordham, N Y* (New York, 1891)

FORDIL'LA (Neo-Lat, named in honor of the discoverer, S W Ford) A small bivalve shell found in the limestones of Lower Cambrian age of Rensselaer and Columbia counties, New York See CAMBRIAN SYSTEM, PELECYPODA

FORD'S THEATRE A Washington theatre, in which President Lincoln was assassinated by Booth, April 14, 1865 The building was purchased in 1866 by the United States government and was used until 1887 as the Army Medical Museum and later as the Pension and Records Bureau of the War Department It collapsed, with the loss of many lives, on June 9, 1893

FORDUN', JOHN OF (?–c 1384) A Scottish historical writer He was probably a chantry priest in the cathedral of Aberdeen He is said to have traveled on foot through Britain and Ireland in search of materials for a chronicle of Scotland, which he had set himself to compile This was probably between 1363 and 1384. He died probably in 1384, or a little later His *Chronica Gentis Scotorum* consists of five books, extending to 1153, and a part of book vi, which deals with English history His *Gesta Annalia* extend from 1153 to 1383 The work which John of Fordun left unfinished was continued by Walter Bower (q v) Bower gives him credit for the first five books of the *Chronica Gentis Scotorum* and part of the sixth, but claims the last 10 books (*Gesta Annalia*) as his own He used Fordun's material, however, up to 1371 The whole was published under the name of *Scotichronicon,* and it is the chief authority for the history of Scotland prior to the fifteenth century, its value being greatest for the fourteenth, where it is contemporary Four printed editions have been published, of which the best is that by Skene (Edinburgh, 1871–72), from the text of the Wolfenbuttel and other standard manuscripts Bower's interpolations and additions are separated from Fordun's text Consult Maxwell, *Early Chronicles Relating to Scotland* (Glasgow, 1912)

FORDYCE, fôr'dīs A town and the county seat of Dallas Co, Ark, 78 miles south of Little Rock, on the Chicago, Rock Island, and Pacific, and the St Louis Southwestern railroads (Map Arkansas, C 4) Its chief industry is the manufacture of lumber, staves, and spokes Pop, 1900, 1710, 1910, 2794

FORE'CAST, WEATHER See METEOROLOGY, WEATHER BUREAU

FORECLO'SURE. The legal process whereby a mortgagor's right, or "equity," of redemption is cut off and the mortgagee's title to the mortgaged lands or goods perfected In order to put a limit on the "equity of redemption" of the mortgagor (see EQUITY OF REDEMPTION) the remedy of foreclosure was devised by the Court of Chancery It is available to the mortgagee at any time after default and is instituted by a bill of foreclosure praying that an account may be taken of the principal and interest due under the mortgage, and that the mortgagor, on failing to pay the mortgage debt by a specified date, may forfeit his equity of redemption If on the day fixed for payment the money be not forthcoming, the mortgagor will be declared to have forfeited his equity of redemption, and the mortgagee will be allowed to retain the estate in perpetuity This method of enforcing the security of the mortgagee of lands is still in use in England and in many of the United States

In a few of the American States, however, in which the mortgage has come to be regarded as a mere lien, and not as a legal estate in the mortgagee, a statutory process, known also as a foreclosure, has been adopted in lieu of the foregoing process of "strict" foreclosure This differs from the older method principally in the fact that it involves the satisfaction of the debt, not by a forfeiture, but by a sale of the mortgaged premises The suit, which is also in equity, is instituted by the mortgagee as plaintiff, the mortgagor and all creditors, subsequent lienors, and other parties in interest, being made defendants The demand is for a judgment that the defendants be foreclosed and cut off from all their interest in the mortgaged premises, and that the same be sold to satisfy the mortgage debt The sale is made upon notice and is at public auction, generally by the sheriff or a referee appointed by the court. After the sale

the money in the hands of the referee will be applied to the payment of the mortgage, and any surplus may be claimed by subsequent mortgagees, or, if there is no other claim upon it, it will be paid to the mortgagor Other methods of effecting a foreclosure, by legal rather than equitable process, as by a writ of entry or of ejectment directed by the mortgagee against the mortgagor, also occur in a few States See EQUITY OF REDEMPTION, MORTGAGE, and the authorities there referred to

FOREFANG See FORFANG

FOREIGN ATTACHMENT A process which a few local courts of England have authority, by immemorial custom, to issue The custom of the Mayor's Court of London is that when a foreigner defendant, of whom the court has jurisdiction, does not appear in response to a summons served on him, the plaintiff may attach his goods or debts due to him as security to enforce his appearance Recent decisions of the House of Lords have so narrowed the custom and have pointed out so many difficulties of procedure under it that it has fallen into disuse In this country the attachment or garnishment of the goods or debts of nonresidents is regulated by statutes in the several States See ATTACHMENT, GARNISHMENT, and the authorities there referred to

FOREIGN JUDGMENT The judgment of a tribunal in a jurisdiction independent of that in which it is sought to be enforced The effect to be given to such a judgment depends either upon treaty or the comity of nations A government is not bound to enforce a judgment rendered in another country, nor even to recognize its existence, unless it has bound itself by treaty to do so As a matter of courtesy, however, towards sister states, as well as from considerations of convenience to suitors, every civilized nation is accustomed to treat a foreign judgment as conclusive upon the parties thereto concerning the matters decided by it, unless it is shown that the judgment was obtained by fraud, or that the court granting it did not have jurisdiction.

The States of the United States are foreign to each other so far as their judicial systems are concerned They are subject, however, to the Federal Constitution, which declares that "full faith and credit shall be given in each State to the public acts, records, and judicial proceedings of every other State And the Congress may by general laws prescribe the manner in which such acts, records, and proceedings shall be proved, and the effect thereof" (Art IV, Sec 1) This does not mean that a judgment obtained in one State can be enforced by an *execution* issued in another State It only means that if an action is brought upon such judgment in another State, or if the judgment is pleaded there in bar to an action brought for the same cause, it shall receive the same credit that it would receive in similar circumstances in the State where it was rendered The refusal of some States to recognize a judgment or decree (as a decree of divorce) rendered in another State is based on the finding that such judgment or decree is a nullity because fraudulently obtained or because the court rendering it acted beyond its jurisdiction In other words, a foreign judgment is entitled to recognition only if it is a valid judgment in accordance with the law governing the tribunal by which it was rendered

By common law a foreign judgment is proved by an exemplified copy under the great seal of the State, or by a true copy proved to be such by a witness who compared it with the original, or by the proper certificate of an officer duly authorized by law Special methods of proving such judgments are provided by statute in the various States (See DIVORCE, JUDGMENT) Consult A C Freeman, *Treatise on the Law of Judgments* (4th ed, San Francisco, 1892), H C Black, *Handbook on the Law of Judicial Precedents* (St Paul, 1912), H W Seton *Forms of Judgments* (7th ed, Toronto, 1912), J R Rood, *Leading and Illustrative Cases with Notes on the Law of Judgments* (3d ed, Ann Arbor, 1913)

FOREIGN LAW The law of a foreign country The law of a state is, under modern conditions, entirely without authority in any other country, though foreign states may, as a matter of international comity, recognize the validity of acts legally performed in other countries, and may even, under proper conditions, administer the rules and principles of foreign law in its own tribunals As to the circumstances under which this will be done, see CONFLICT OF LAWS

For judicial purposes the several States of the Union are foreign to each other, though the comity subsisting between them is of the strongest character, and the Constitution of the United States (Art IV, Sec 1) requires the recognition by one State of the validity of judicial acts of another See FOREIGN JUDGMENT, EXTRADITION

The courts of a country do not take judicial notice of foreign laws, but, where they are in issue, require them to be proved as matters of fact Foreign statutory law may be proved by duly certified copies of the statutes in question, or even by printed compilations issued by the authority of the state enacting them Foreign customary, or unwritten, law, however, can be proved only by the sworn testimony of properly qualified experts, though it has been held in the United States that the law of a kindred system like that of England may be established for judicial purposes by the citation of reported cases and textbooks of recognized authority The Federal courts of the United States, however, even in matters in which they have no jurisdiction, will always take judicial notice of the laws of all the States See COMITY OF NATIONS, INTERNATIONAL LAW

FOREIGN MONEY, VALUE OF. For the purpose of fixing the rates at which the different foreign coins shall be computed for the purpose of determining the values of goods imported into the United States, it is made the duty of the Director of the Mint to publish from time to time the values of foreign coins This was formerly done annually, but the fluctuating value of silver coins led in 1890 to a change in the law, requiring the statement to be made quarterly Gold coins are reckoned by comparing the number of grains of fine gold which they contain with the amount of gold in the dollar Silver coins are reckoned at the average value of the pure metal they contain during the three months prior to the determination of their value When the values are determined by the Director of the Mint and proclaimed by the Secretary of the Treasury, they are valid in estimating the value of imports for the succeeding three months See accompanying statement for April 1, 1914.

VALUES OF FOREIGN COINS

COUNTRY	Legal standard	Monetary unit		Value in terms of U S money	Remarks
Argentine Republic	Gold	Peso		$0 9648	Currency Paper, normally convertible at 44 per cent of face value, now inconvertible
Austria	Gold	Krone		2026	
Belgium	Gold and silver	Franc		1930	Member Latin Union, gold is actual standard
Bolivia	Gold	Boliviano		3893	12½ bolivianos equal 1 pound sterling
Brazil	Gold	Milreis		5462	Currency Government paper normally convertible at 16 pence (=$0 3244) per milreis
British Colonies in Australasia and Africa	Gold	Pound sterling		4 8665	
British Honduras	Gold	Dollar		1 0000	
Bulgaria	Gold	Lev		1930	
Canada	Gold	Dollar		1 0000	
Chile	Gold	Peso		3650	Currency Inconvertible paper
China	Silver	Tael	Amoy	8318	The tael is a unit of weight, not a coin The customs unit is the Haikwan tael The values of other taels are based on their relation to the value of the Haikwan tael The Yuan silver dollar of 100 cents is the monetary unit of the Chinese Republic, it is equivalent to 644+ of the Haikwan tael
			Canton	8293	
			Cheefoo	7955	
			Chin Kiang	8125	
			Fuchau	7694	
			Haikwan (customs)	8463	
			Hankow	7782	
			Kiaochow	8060	
			Nankin	8237	
			Niuchwang	7800	
			Ningpo	7997	
			Peking	8109	
			Shanghai	7598	
			Swatow	7683	
			Takau	8370	
			Tientsin	8060	
		Dollar	Yuan	5390	
			Hongkong	5471	
			British	5471	
			Mexican	5511	Mexican silver pesos issued under Mexican decree of Nov 13, 1918, are of silver content approximately 41 per cent less than the dollar here quoted, and those issued under decree of Oct 27, 1919, contain about 51 per cent less silver
Colombia	Gold	Peso		9733	Currency Government paper and gold
Costa Rica	Gold	Colon		4653	
Cuba	Gold	Peso		1 0000	
Denmark	Gold	Krone		2680	
Ecuador	Gold	Sucre		4867	
Egypt	Gold	Pound (100 piasters)		4 9431	The actual standard is the British pound sterling, which is legal tender for 97½ piasters
Finland	Gold	Markka		1930	
France	Gold and silver	Franc		1930	Member Latin Union, gold is actual standard
Germany	Gold	Mark		2382	
Great Britain	Gold	Pound sterling		4 8665	
Greece	Gold and silver	Drachma		1930	Member Latin Union, gold is actual standard
Guatemala	Silver	Peso		5074	Currency Inconvertible paper
Haiti	Gold	Gourde		2000	Currency Inconvertible paper
Honduras	Silver	Peso		5074	Currency, bank notes
India [British]	Gold	Mohur and sovereign		4 8665	The British sovereign and half sovereign are legal tender in India at 10 rupees per sovereign
	Silver	Rupee		2411	
Indo-China	Silver	Piaster		5480	
Italy	Gold	Lira		1930	Member Latin Union, gold is actual standard
Japan	Gold	Yen		4985	
Liberia	Gold	Dollar		1 0000	Currency Depreciated silver token coins Customs duties are collected in gold
Mexico	Gold	Peso		4985	
Netherlands	Gold	Guilder (florin)		4020	
Newfoundland	Gold	Dollar		1 0000	
Nicaragua	Gold	Cordoba		1 0000	
Norway	Gold	Krone		2680	
Panama	Gold	Balboa		1 0000	
Paraguay	Gold	Peso (Argentine)		9648	Currency Depreciated Paraguayan paper currency
Persia	Silver	Kran		0934	Currency Silver circulating above its metallic value Gold coin is a commodity only, normally worth double the silver
Peru	Gold	Libra		4 8665	
Philippine Islands	Gold	Peso		5000	
Portugal	Gold	Escudo		1 0805	Currency Inconvertible paper
Rumania	Gold	Leu		1930	
Russia	Gold	Ruble		5146	
Salvador	Gold	Colon		5000	
Santo Domingo	Gold	Dollar		1 0000	
Serbia	Gold	Dinar		1930	
Siam	Gold	Tical		3709	
Spain	Gold and silver	Peseta		1930	Valuation is for gold peseta; currency is notes of the bank of Spain.
Straits Settlements	Gold	Dollar		5678	
Sweden	Gold	Krona		2680	
Switzerland	Gold	Franc		1930	Member Latin Union, gold is actual standard.
Turkey	Gold	Piaster		0440	(100 piasters equal to the Turkish £)
Uruguay	Gold	Peso		1 0342	Currency Inconvertible paper
Venezuela	Gold	Bolivar		1930	

FOREIGN TRADE See IMPORTS AND EXPORTS, FREE TRADE, TARIFF, BALANCE OF TRADE

FOREIGN WARS, MILITARY ORDER OF An hereditary patriotic society instituted in New York City in 1894, as the Military and Naval Order of the United States, but known under its present name since 1895 The objects of the order are to honor and preserve the names and memory of those who aided in maintaining the United States government in the five foreign wars in which it has been engaged—viz, the War of the Revolution, the War with Tripoli, the War of 1812, the Mexican War, and the War with Spain—and to collect the records and documents relating to these wars It admits to membership Veteran Companions, consisting of commissioned officers of the army, navy, and marine corps of the United States who participated in any of these foreign wars, and also Hereditary Companions, direct lineal descendants of commissioned officers in the male line The national organization is made up of 20 State commanderies The order had in 1914 a membership of over 1500 companions, among whom were many of the leading officers of the army and navy This order has been officially recognized by several European monarchs

FOREIGN WEIGHTS AND MEASURES. See WEIGHTS AND MEASURES

FOREKNOWLEDGE AND FOREORDINATION Terms of theology, signifying God's knowledge of all things before they come to pass (foreknowledge), and the eternal purpose which finds its execution in the history of man (foreordination)

There have been various theories of foreknowledge (*a*) It is viewed simply as one of the divine perfections, absolute because the nature of God is infinite, and thus embracing all events whatsoever, including the volitions of free beings, but capable of no explanation except that it is a fact of the nature of God Foreknowledge is no more of a mystery upon this view than any knowledge, or any other attribute of God (*b*) A kindred view adds an element of explanation from the "ideality of time." There is no time to God, and hence foreknowledge, in the human sense of that word, does not exist To know the future does not essentially differ from the knowledge of the present, for all the future is present to God (*c*) Foreknowledge depends upon foreordination God has in some sense foreordained all things, and what He foreordains He knows, not with an immediate vision, as is supposed by the previous theories, but by the knowledge of inference and imagination (*d*) The foreknowledge of God is limited by the freedom of man, inasmuch as he cannot foreknow contingent volitions which are essentially uncertain This is a voluntary self-limitation, since God has Himself given His creatures freedom This theory has been proposed at various periods in history, but has always met with criticism as militating against the infinity of God It is, however, finding increased favor at the present day in many quarters

The proofs of God's foreknowledge have been derived from the perfection of God and from the Scriptures Even men have a certain kind and degree of foreknowledge, which is absolutely essential to them in the regulation of life If God were nothing more than an infinite man, He must have at least the same sort of foreknowledge and in an infinite degree This proof is reenforced by the Scriptures, which ascribe the most various and minute foreknowledge to God Yet neither of these proofs goes so far as they have often been supposed to go Nothing in Scripture answers the question whether free volitions are in themselves subject to foreknowledge Many are, for, though free in their essential nature, they are made in conformity with the balance of motives and may be foreknown This fact is the foundation of society But, while volitions remain free, are there none that are unaccountable, against the balance of motives, and hence uncertain? That is the question of free will (q v), and it would be false exegesis which would rest its determination upon passages of Scripture

Foreordination pertains to all events So much is maintained by all theologians Some teach that all events are embraced in foreordination in the same sense and way This theory differs from fatalism because intended to be consistent with the freedom and responsibility of the creature, and it may be consistent if determinism (see FREE WILL) is consistent, as was maintained by Edwards and many others Some types of Calvinism made a distinction between foreordination and permission The first sin of man is then said to have been permitted, and the lost are said not to have been "reprobated," but "passed over" by electing grace, i e, left in the sinful state into which they have voluntarily brought themselves (so the Westminster Confession) Others, with more direct reference to free will and with a conception of the divine government as a moral government—i e, one through persuasives acting upon the will—have said that foreordination is the determination in the first instance as to what God will Himself do From what He does, often follows immediately what men do, as in regeneration which leads to conversion, or when He does not do what would prevent sin Thus He often indirectly foreordains what men shall do This indirect foreordination will ultimately extend to the entire circumference of the government of God, and it will be in such a sense that it can be said that God foreordains "whatsoever cometh to pass" The divine government embraces all things even when it is in part a government of permission

The existence of God involves the idea of plan (teleological argument), and plan is foreordination Conceived as the plan of the world and of the history of man, foreordination may be interpreted by the actual course of events.

The grounds of this plan are to be found in the infinite wisdom and goodness of God. Whatever may be the success with which various schools have made this clear, such has been the meaning of all theologians The most extreme schools of supralapsarians have believed that the lost were lost in consequence of their own sin, for which they were guilty, and which deserved in justice precisely the punishment they received, and they have also believed that justice must be done, and that neither wisdom nor goodness could permit it to go unsatisfied The doctrine of election, which is but a corollary of foreordination, has often been regarded as a doctrine of favoritism But theologians have never meant this by it They have always founded it in the wisdom and goodness of God They have often maintained that God elected every one who could be gained to righteousness by all the resources of His government They have sometimes taught that more efforts were put forth

for the finally lost than for some who were actually saved The differences between the schools upon this doctrine have often been resolvable into this, that some referred a given fact to God, because it was under His government though by permission, while others ascribed it purely to man because done by him, though confessedly under a governmental permission

The consistency of plan with free agency must be a real consistency under the divine government because it is real under human governments A human governor can successfully determine to conquer a country under the conditions in which he is placed, and can successfully carry out his determination, as when Frederick the Great conquered Silesia God can do the same The attempts of philosophy to explain this consistency do not affect its reality, whether more or less successful Calvinism has been especially concerned with these doctrines Consult Calvin's *Institutes*, Edwards's *Freedom of the Will*, the *Westminster Confession*, Mozley, *Treatment on the Augustinian Doctrine of Predestination* (London, 1855), McCabe, *The Foreknowledge of God and Cognate Themes* (New York, 1878), Bruce, *The Providential Order of the World* (New York, 1899), Richards, *God's Choice of Men* (New York, 1905) See FREE WILL

FOREL, fō'rĕl', AUGUSTE [HENRI] (1848–) A Swiss entomologist and psychologist. He was born at Morges (Canton of Vaud), studied at the universities of Zurich and Vienna, became a lecturer at Munich in 1877, and after 1879 held the chair of psychiatry at Zurich, from which he resigned in 1897 He was connected as assistant and director with various institutions for the insane His works include the prize essay *Les fourmis de la Suisse* (1874), *Der Hypnotismus* (1889, 6th ed, 1911, Eng trans by Armit, 1906), *Gehirn und Seele* (1894, 11th ed, 1910), *Die psychischen Fahigkeiten der Ameisen und einiger anderen Insekten* (1901–04, trans by Wheeler, *Ants and Some Other Insects*, 1912), *Hygiene der Nerven und des Geistes* (1903, 4th ed, 1913, Eng trans by Aikins, *Hygiene of the Nerves and Mind*, 1907), *Die sexuelle Frage* (1905, 9th ed, 1909, new ed, 1913, *The Sexual Question*, trans by Marshall, 1908), *Sinnesleben der Insekten* (1886, 1910, Eng trans by Yearsley, 1908)

FOREL, FRANÇOIS ALPHONSE (1841–1912). A Swiss physician and naturalist, brother of the preceding, born at Morges (Canton of Vaud) After medical studies he was appointed professor of anatomy and physiology in the University of Lausanne His studies concern the glaciers and lakes of Switzerland and earthquakes, on which he became an international authority He invented a xanthometer His writings appeared in *Le Leman* (3 vols, Paris, 1892–1904) and in the *Handbuch der Seenkunde* (Stuttgart, 1901)

FORE'LAND, NORTH AND SOUTH Two promontories on the east coast of Kent, England —NORTH FORELAND, the Cantium of Ptolemy, forms the northeast point of the county, and is in lat. 51° 22′ N, 2 miles east of Margate, on the Thames estuary (Map England, H 5) Its chalk cliffs, 188 feet high, projecting into the North Sea, are crowned by a lighthouse, with a fixed light, 184 feet high, visible 24 miles —SOUTH FORELAND, also composed of chalk cliffs, 16 miles south of North Foreland and 3 miles northeast of Dover, has two fixed lights, respectively 375 and 290 feet above the sea and visible about 25 miles (Map England, H 5) They indicate the proximity of the dangerous Goodwin Sands (q v) and the anchorage of the Downs (q v)

FOREN'SIC MEDICINE See MEDICAL JURISPRUDENCE

FOREORDINATION See FOREKNOWLEDGE AND FOREORDINATION

FORE'SHORE. In English law, the seashore, the strip of land subject to the ebb and flow of the tide and lying between the ordinary high-water and low-water mark The title to the foreshore is at common law prima facie in the crown, but may be shown to have become vested in a subject either by grant from the crown or by evidence from which a grant can be presumed It has been contended by eminent authority (Stuart Moore, *History of the Fore shore*) that the presumption should be the other way, in favor of the subject's title instead of that of the crown, but, however this may be, the law has come to be settled the other way, in this country generally (though not universally) as well as in England For the rights and liabilities with respect to the foreshore, especially of the public and of adjoining owners, see the title SEASHORE

FORESHORT'ENING That view of a figure or portion of a figure which, obeying the laws of perspective, diminishes in actual extent according to the angle at which it is seen For example, a figure looked at from below becomes condensed, as it were, in length, and in portraying such an abrupt view there would be less space demanded than if the figure stood upright on the same level as the observer In the same sense an arm extended and pointing directly out of the picture would require less actual space on the canvas than an arm laterally extended The representation, then, of this effect of reduced space suggesting at the same time the actual length of the object, is termed foreshortening It is practiced more or less by all painters as occasion demands, and it is always called for in the painted ceiling, where figures are represented as above one's head Some of the chief masters of foreshortening among the Italians were Melozzo da Forlì, Luca Signorelli, Michelangelo, Tintoretto, and, especially, Correggio, who in his frescoes of the cupola of Parma went further than had any before him His example was followed by painters of the baroque and rococo period, who often introduced foreshortening into their works merely for the purpose of parading their technical skill In modern times greater care prevails, and foreshortening is practiced only with reference to the laws of perspective Consult G A Storey, *The Theory and Practice of Perspective* (London, 1910)

FOR'EST (OF *forest*, Fr *forêt*, It, ML *foresta*, forest, from Lat *foras*, *foris*, out of doors, *fores*, door, Gk *θύρα*, *thyra*, OChurch Slav. *dvĭri*, Lith *dùrys*, Goth *daúrōns*, OHG *turi*, Ger *Thur*, AS *duru*, Eng *door*) A tract of land covered with a natural growth of trees. From the standpoint of vegetation the world may be roughly divided into forest, grassland, and desert, the area of each being determined by various climatic factors Among these climatic factors atmospheric moisture takes a prominent place, as can readily be seen in comparing a vegetation chart of the world with a rainfall chart Other things being equal, the greater the rainfall, the

richer the forest Forests seem to be in a measure independent of the seasonal distribution of rain, since they occur in regions of daily rain, of summer rain, or winter rain Endurance through dry seasons is made possible by the great depth of tree roots, and also by the thick and leathery leaf texture in the case of evergreens, or by the shedding of leaves in deciduous trees Because of the heat, more water is required by a tropical forest to meet the demands of transpiration than by a forest in the temperate zone Another factor, perhaps of equal importance with moisture, is wind Kihlman has shown that the presence or absence of trees in Arctic regions is not a question of cold, nor even of a season's length, but of winter winds, trees grow only where they are protected from the great loss of water by transpiration induced by dry winter winds by being buried under the snow, the height of the trees thus marks the winter level of the snow Since the winds of eastern Argentina are strong during the resting period, grassland is present, though the moisture is sufficient for a forest

The forest formations of the world may be divided into eight types, based chiefly on the ecological characters of the leaves (See LEAF) 1 The evergreen forest of the tropical regions of diurnal rainfall This forest is especially well developed in the regions of the trade winds in oceanic climates, as of Brazil and Malaysia This type is often called the rainy forest and may be taken as representing the climax of the world's vegetation Here plants grow in vast profusion and great diversity of form, and lianas, or climbing plants, and epiphytes reach their greatest development Simultaneous periodicity is largely wanting, so that the forest is always in active life 2 The deciduous monsoon forest, especially characteristic of the monsoon district of India, differs from the forest first named chiefly in having simultaneous periodicity The other characters of the rainy season are present, but in a less complete degree 3 The evergreen forest of the temperate zone is essentially an extension of the tropical evergreen forest into the cooler regions, especially of the Southern Hemisphere It is peculiar to pronounced oceanic climates with markedly uniform temperature and moisture 4 The deciduous forest of the north temperate zone is the typical forest formation of the eastern United States The forests of beech, maple, chestnut, oak, etc, are too familiar to need description The radical difference between the forests of the same latitudes in the Northern and Southern hemispheres is doubtless associated with the continental climates of the one and the oceanic climates of the other 5 The deciduous savanna forest of the tropical and warm temperate regions is transitional between forest and grassland (q v), having a parklike aspect, which is due to scattered trees in a district where grasses form the chief undergrowth Such a forest commonly has a moderate rainfall 6 The thorny or scrubby forest of tropical and warm temperate regions where the rainfall is slight is transitional between forest and thicket (q v) 7 The forest of temperate regions where the rainfall occurs in winter is finely shown in the Mediterranean region, coarse and leathery but large evergreen leaves, like those of the holly, laurel, oleander, and the evergreen oaks, may be taken as typical of such regions 8 The conifer forests, the pines and firs with their leathery needle-shaped evergreen leaves, form great forests in the colder regions of the temperate zones, especially of the Northern Hemisphere

The forests heretofore discussed are all climatic and widespread Edaphic (q v) or local forests also occur Indeed, in most of the regions where the above climatic types are found, there are localities in which other forest combinations are present For example, in a swamp in the deciduous zone of the northern United States there may be found tamarack, spruce, and white cedar Close observation in such a place for many years would doubtless show the gradual dying out of these trees and their replacement by the ordinary members of the deciduous forest On a hill there may often be found a pine-plant association, but this is not a permanent condition Pines are often likely to be followed in a natural sequence by oaks, and they in turn by maples and beeches These changeable plant associations may be called edaphic, while the ultimate forest towards which all are tending may be called the climatic formation Viewed in this light, the eight great forest types outlined above are forest formations

FORESTALL/ING. The buying of provisions with a view to enhancing the price thereof in open market This was a common-law offense and was the subject of early and repeated legislation It was described by Statute of 5 and 6 Edw VI, c 14, as the buying or contracting for any merchandise or victual coming in the way to market, or dissuading persons from bringing their goods or provisions there, or persuading them to enhance the price when there It was analogous to engrossing (q v) and regrating (q v) Modern conditions of trade have rendered these practices legitimate and the laws intended to regulate them obsolete, while at the same time the abuses referred to have, under the name of "corners" and monopolies, become more flagrant and oppressive The laws against forestalling and allied offenses against trade have long been obsolete and were formally repealed in England by Statute 7 and 8 Vict, c 24 In the United States they have remained unenforced Consult the authorities referred to under CRIMINAL LAW

FOREST CANTONS, THE FOUR The four cantons of Schwyz, Uri, Unterwalden, and Lucerne, in Switzerland

FOREST CITY. A borough in Susquehanna Co, Pa, 23 miles north by east of Scranton, on the Delaware and Hudson, the Erie, and the New York, Ontario, and Western railroads (Map Pennsylvania, L 3) Coal mining and silk manufacturing are the chief industries, and there are important agricultural interests Forest City was incorporated in 1888 and is governed by a burgess, quadriennially elected, and a unicameral council Pop, 1900, 4279, 1910, 5749

FOREST CITY, THE A name given to Cleveland, Ohio, famous for its shade trees

FOR/ESTER, FRANK A nom de plume of Henry William Herbert (q v)

FORESTERS, ANCIENT ORDER OF A fraternal organization founded in 1745 at Knaresborough Castle, in Yorkshire, England. The order was introduced into the United States in 1832 by the establishment of Court Good Speed, 201, in Philadelphia In 1914 there were three high courts, and 439 subordinate courts in the United States, with a membership of about 50,000 The order throughout the world has about 1 600 000

members The order has courts in 36 countries, and a reserve fund of over $50,000,000 Funds are raised by fixed dues, and more than $5,000,000 annually are distributed in benefits

FORESTERS, INDEPENDENT ORDER OF A fraternal and benevolent society founded at Newark, N J, in 1874 and reorganized in 1881 The order is general throughout the United States and Canada and has branches in Great Britain, Norway, France, India, and Australia Its government is vested in a supreme court, with delegates from all the countries represented High courts, corresponding to the grand lodges of other societies, have supervision of the order in various states and countries There were in the United States in 1914 one high court and 4149 subordinate courts The members numbered 246,463 The disbursements since its organization aggregated nearly $40,000,000, and the annual disbursement about $3,500,000

FORESTERS OF AMERICA A benevolent and fraternal organization known under its present title since September, 1895 Originally the order was part of the Ancient Order of Foresters, founded in England in 1745, and introduced in the United States in 1832 In 1889, however, the American order freed itself from the jurisdiction of the high court in England and became a separate organization It had, in 1914, 18 grand courts and 1865 subcourts There were about 245,000 members The disbursements since its organization aggregate nearly $35,000,000

FOREST FLY. The British name of a small, widely distributed fly (*Hippobosca equina*), representing that aberrant division of Diptera styled Eproboscidea (see FLY) and the family Hippoboscidæ These minute insects are louse-like in appearance and habits, dwelling altogether as parasites among the hairs of animals and feathers of birds, and some forms are called "bird ticks" A common species on large birds in America is *Olfersia americana* Species of another genus, *Lipoptera*, have wings when young and live upon birds, but after a time they migrate to some mammal, and there, having no further use for their wings, wrench or bite them off Another genus, *Melophagus*, includes the wingless sheep ticks, a whole family, the spider-like bat ticks (Nycteribiidæ), inhabit the fur of bats alone, and another includes the bee louse (Braulidæ) All obtain their living by piercing the skin and sucking the blood with an extensile tube thrust out from the mouth An extraordinary feature in the economy of all these flies is that they do not lay their eggs, but retain them until they hatch into larvæ, and the larvæ are almost ready to pupate, not until then are they extruded by the parent, and only one is produced at a time Hence the group is sometimes named Pupipara by some systemists

FORESTI, fō-rĕs'tē, ELEUTARIO FELICE (1793–1858) An Italian patriot and scholar He was born at Conselice, graduated at the University of Bologna, practiced law at Ferrara, and in 1816 was made prætor at Crespino He was a member of the Carbonari and from 1819 to 1836 was imprisoned He came in 1836 to the United States He was for many years professor of Italian in Columbia College, and in 1858 he was appointed United States Consul at Genoa He published an edition of Ollendorff's Italian grammar (1846) and *Crestomazia italiana* (1846)

FOREST LAWS, IN ENGLAND Laws for the government of the forests in the King's possession Such forests were vast tracts of country, containing not only woodland, but pastures and even villages Smaller tracts of woodland were called chases, or, if inclosed, parks, and might be included in a royal forest The forests varied in number and extent at different times and were situated in different parts of the kingdom Among the best known were New Forest, in Hampshire, Windsor Forest, and Epping Forest

Most of them, indeed, dated from the Anglo-Saxon period and, having their origin in the uninclosed woodlands which had been national property, became royal demesne in the eleventh century But all the Norman and early Plantagenet kings attempted, with varying success, to increase the forest area by afforestment—a summary proceeding, which consisted in simply proclaiming the desired tract a forest, after it had been inclosed with metes and bounds by royal commission Sometimes the people were allowed to remain, but subject to the strict forest law; often they were ruthlessly driven away The increase of the forest area was attempted not only by such high-handed monarchs as William I and his sons, but until the fourteenth century it was a recurring source of complaint against the kings Such wise kings as Henry II and Edward I were guilty of the same practice, and it was not until 1301 that the latter finally yielded to the wishes of his people and permanently put an end to afforestment by force When Henry VIII created Hampton Court Forest, he was obliged to pay the freeholders for the lands of which he deprived them, and even Charles I is said to have followed a like course when he created Richmond Park From early times a king had occasionally alienated a forest to an individual with authority to enforce the forest laws over them as he had done In the fourteenth century all the forests in the County of Lancaster were held by the earls of Lancaster subject to the same laws as those held elsewhere by the King

We have no means of determining the state of the law at the time of the Conquest A series of enactments attributed to Canute is of such uncertain authority as to have been rejected by Coke in 1548, and Dr Liebermann has recently shown that it is a forgery of about 1184 All that we know of his legislation on this subject is that he permitted every man to hunt in his own wood, but forbade trespassing in the King's forest

The terrible severities of the Norman period are usually said to have been introduced under Henry I, but in his charter of liberties Henry professes merely to retain the forests as his father had held them His law claimed supreme jurisdiction over private forests as well as over his own and prescribed terrible penalties for the killing of game, among which were death, blinding, and emasculation The Assize of the Forest, issued by Henry II in 1184, retains these punishments, but mitigates others and prescribes the limits of the jurisdiction of forest courts The extreme rigor with which this otherwise just King enforced the forest law gave cause for great complaint In the Great Charter John renounced his afforestments, promised reform of all bad customs, and excused from attendance on the forest courts those not living in the forest The Charter of the Forests, issued by the Earl Marshal for Henry III in 1217, was a still

more liberal document, greatly diminishing the punishments, the severest of which is now imprisonment for a year and a day Besides confirming the provisions of Magna Charta, it permits freemen to exercise many other rights, such as those to mills, fish ponds, marlpits, arable land, falcons, etc, on their own land, within the forest Renewed by Edward I and supplemented by another ordinance in 1306, it remained the basis of the forest laws of the kingdom

In general, the inhabitants of the forest folds were subject to the royal rights of forestry These were both of *vert*, i e, to every kind of tree and brush in the forest, and *venison*, i e, to every wild beast of the forest They were not allowed to hunt or cut wood or brush on their own land without license of the royal official They indeed retained some rights of pasture for *commonable* beasts (excluding sheep, goats, geese, and swine), but they might not use as much as would deprive the King's beasts of food

The officers of the forest were numerous and important In 1238 two provinces, divided by the river Trent, were established for forest administration, and a justice was appointed for each province Under such justice was usually a warden for each particular forest, verderers, whose chief duties were discharged at the forest court and who were responsible to the King and not to the warden, foresters, whose duties were similar to those of a modern gamekeeper Still other officers were the foresters in fee, woodwards, rangers, regarders, and agisters

The forest courts were three in number, running parallel with the ordinary courts of justice There was the *woodmote*, or court of attachments, held before the verderers every 40 days It tried minor trespasses only and could not convict The *swanmote* was held three times a year by the same officials, all freeholders of the forest being bound to attend Presentments were made by a jury which tried and convicted, but did not pass judgment This was reserved for the justices in eyre, who every third year held the *court of justice seat*, a supreme court of civil and criminal jurisdiction over all offenses committed in a forest, whether against the forest law or not

The last important general forest legislation was passed by the Long Parliament in 1640 Charles I had been exacting fines for alleged encroachments on his forests, and Parliament replied with an act for the "certainty of forests," exempting from prosecution any alleged encroachments which were considered valid in the second year of James I Since that act the laws of the forest have practically ceased The crown still retains ancient forestal rights over private lands in Dean Forest and New Forest, but such rights survive as curious legal anomalies. During Queen Victoria's reign three of the royal forests, viz, Hainault, Whittlewood, and Wichwood, were disafforested by act of Parliament It would be better, however, if the remainder, and particularly such as are near large cities, could be held as national parks and recreation grounds This has recently been done in the case of Epping Forest near London and seems to be the probable destiny of others as well

The royal forests of Scotland were nearly as numerous as those of England, and their area was larger in proportion to that of the country. As in England, there was a special code for them Indeed, this code is so much like the English that it seems to have been derived from it The penalties, however, are not so severe, nor did afforestation play such a prominent part in the Scottish constitutional struggle as in the English The best edition of the Scottish forest code is in the *Acts of the Parliaments of Scotland* (Edinburgh, 1844) The best study of the English forest law and procedure is Turner, *Select Pleas of the Forest* (London, 1901)

Bibliography. Most of the laws are given in convenient form by Stubbs, *Select Charters* (Oxford, 1895), they are published in full in the *Statutes of the Realm*, Record Commission, vol i (1810), Coke's *Fourth Institute of the Laws of England* (London, 1548) is the earliest legal authority, and the most complete is Manwood's *Treatise of the Laws of the Forests* (ib, 1598) For good brief modern descriptions, consult Stubbs, *Constitutional History*, i (Oxford, 1896–97), 'Forest Laws," in the *Encyclopædia of the Laws of England*, ed by Ranton (London, 1895–98), Cox, *The Royal Forests of England* (ib, 1905), Townley, *English Woodlands and their Story* (ib, 1910)

FOREST OAK A name sometimes given in commerce to the timber of *Casuarina torulosa*, and other species of the same genus, all Australian trees In Queensland the wood is considered as one of the most valuable for fuel and is also split into shingles It is light yellowish brown and prettily marked with short red veins It is exported for use in cabinetwork for which purpose it is employed as veneer

FOREST PARK. A village in Cook Co, Ill, 4 miles west of the city limits of Chicago, on the Chicago, Great Western, the Baltimore and Ohio Chicago Terminal, and the Minneapolis, St Paul, and Sault Ste Marie railroads, and on the Des Plaines River It is mainly a residential suburb of Chicago and contains the well-known Harlem race track There are several cemeteries here, among them Forest Home and Waldheim—the latter of note as the site of a monument to the anarchists executed for complicity in the riot in 1886 (See CHICAGO) Settled in 1854, Forest Park was incorporated as Harlem in 1883, and its name was changed in 1907. It adopted the commission form of government in November, 1912 The village owns the water works and electric-light plant Pop, 1900, 4085, 1910, 6594, 1920, 10,768

FOREST PRESERVATION. See FORESTRY, LUMBER INDUSTRY.

FOREST RESERVES See FORESTRY

FOR'ESTRY (from ML *forestaria, forestaria*, forestage, from *foresta*, forest). The economic management of trees as communities It is distinct from arboriculture, which is more strictly concerned with the individual tree Forestry looks to the conservation and utilization of the various forest products in order that the greatest returns may be obtained It may apply to the planting of a new forest or the preservation of an old one, the reforestation of a mountain side, the prevention of ruthless forest destruction, or the utilization of the forest products as a crop The uses of a forest are to supply timber, fuel, etc., to offer protection against winds, to conserve moisture, by storing up water or at least by checking its loss by seepage and evaporation, and to minister to the enjoyment of man in providing parks, game covers, etc In many new countries forests are

considered detrimental to the growth of the varied interests upon which the new community is dependent, and they are removed as rapidly as possible In older regions the lack of forests is keenly felt in various ways, and attempts have been made to restore, in part, the former wooded areas

History. In some form forestry has been practiced in Europe for several centuries The growing scarcity of timber and fuel began to be felt in England early in the sixteenth century, and attempts were made to supply the failing resources by making new plantations and by more scientific cutting of the native growth About the beginning of the eighteenth century plantings were begun in Scotland and later in Ireland, now the artificially planted areas exceed the natural ones About this time there was great activity in the introduction of foreign species of forest trees, many of which were so well adapted to their new conditions that in places there are to-day more exotic than native trees In France, Belgium, Germany, and other parts of Europe extensive areas of forests are now under systems of management that result in increasing rather than in decreasing production Old native forests have been cared for, and denuded areas reforested Governmental, communal, and private forests alike are so managed as to provide the various objects for which they were designed In Germany and France the management of forests has received the greatest attention and has been most systematically and scientifically conducted Government schools are maintained for the education of skilled foresters, and special attention is paid this important subject

Forestry in the United States Forest regulation did not for a time seem as necessary in the United States, with its great forest wealth, as in Europe However, with the destructive methods of lumbering and the enormous waste by forest fires, the supply has been so encroached upon that means have been taken to repair the damage and to provide against its continuance Various States have enacted laws designed to correct the former abuses by granting bounties for tree planting and remission of taxes upon purely forest areas The general government has also attempted to aid by laws providing for the acquirement of land upon the condition of planting a portion to trees Since the laws enacted by the general government were improperly prepared, interpreted, and enforced, and have resulted in little good, they have been repealed The greatest good has probably come from the reservation of extensive areas about the watersheds and sources of some great rivers On July 1, 1913, there were in the United States 163 national forest reserves—or national forests, as they are designated—embracing 186,616,648 acres, situated in whole or in part in Arizona, Arkansas, California, Colorado, Florida, Idaho, Kansas, Michigan, Minnesota, Montana, Nebraska, Nevada, New Mexico, North Dakota, Oklahoma, Oregon, South Dakota, Utah, Washington, Wyoming, Alaska, and Porto Rico These reserves were created by presidential proclamation, and their management is now confided to the Forest Service of the United States Department of Agriculture, having been transferred from the Department of the Interior in 1905 The Forest Service patrols the reserves as a protection against fire and trespass, devises plans for the conservative use of the forests, sells timber under proper regulations, and supervises the grazing privileges and movement of stock through the reserves. Under what is called the Weeks Law the government is purchasing forest lands to protect watersheds in the White Mountain and southern Appalachian regions, and to June 30, 1913, 713,415 acres had been approved for purchase In addition to national forests there are a number of State reserves, the object of which is mainly to prevent the too rapid escape of water in floods, and the succeeding periods of scanty water supply for irrigation and other uses They are situated at the sources of water supplies and are patrolled to insure their safety against marauders and fires

Forestry in Canada The administration of all matters pertaining to the public forests of Canada is vested in a Director of Forestry under the Department of the Interior The organization and objects are similar in many ways to those described above and include studies of forest resources, timber surveys, reforestation, fire protection, etc Rangers are provided for the vast forest area, and much good has been accomplished in the suppression of forest fires By the Act of May 19, 1911, and the amending Act of June 6, 1913, a system of Dominion forest reserves was provided, and there were set aside 23,017,504 acres, comprising 31 reserves, 13 being in British Columbia, 8 in Saskatchewan, 5 in Manitoba, and 5 in Alberta The largest of these is the Rocky Mountains reserve in Alberta, on the east slope of the Rocky Mountains, containing, in 1914, 13,373,772 acres, divided into 5 administrative units each in charge of a forest supervisor The width of the reserve varies from 12 to 100 miles, and it extends from the international boundary line northward 500 miles The cutting of timber in the reserves is permitted under restrictions, also grazing, but permanent settlement is forbidden, although leases are granted for summer resorts, mining claims, and other specified purposes The Province of Ontario has reserves amounting to 12,824,320 acres, and the Province of Quebec has 111,401,280 acres The Dominion has a large area set aside for national parks, the chief of which are Rocky Mountain Park, Alberta, 1,152,000 acres, Yoho Park, British Columbia, 358,400 acres, Glacier Park, 299,520 acres, Jasper Park, Alberta, 640,000 acres. The parks are in charge of a general superintendent, assisted by five local superintendents

Forest Trees Forests are of two kinds, pure and mixed The former are less common than the latter and are usually, though not always, composed of coniferous trees One advantage of a pure forest is the greater ease in lumbering; one disadvantage is its liability to destruction by drought, insects, diseases, etc Among species adapted to pure forests are pines, spruce, silver fir, Douglas fir, beech, and maple Those doing best in mixed woods are larch, birch, poplar, ash, oak, chestnut, and walnut Mixed forests can be grown, and often are grown, as a series of small colonies devoted to single species, but for general purposes mixed woods are most satisfactory. Since the requirements of different species differ as to light, moisture, and soil, the trees of mixed forests protect each other and the forest floor, as the ground is called, better than those of pure forests

Reforestation Forests when once depleted

are restocked in several ways Although the setting out of young trees is one of the most expensive methods of restocking, it has been practiced to some extent in the plains region of the United States and extensively in England The seeds are sown and the young trees reared in nurseries where the peculiar requirements of the seedlings can be carefully met After a growth of several seasons the trees are set in the places where they are to grow Where the surface of the land will permit, they are often cultivated like any other crop until they attain a size sufficient to care for themselves Frequently, too, various crops are grown in the spaces between the rows While expensive, this method is best adapted to the conditions in the prairie region of the western United States A second method is that of hand seeding the region designed for the future forest This method is followed in many places, but the difficulties of collecting and caring for the seed prior to seeding are so great as to make this method unsatisfactory, except where the former forest has been destroyed by fire or other means. Natural seeding is largely depended upon to restock scientifically managed forests, occasional seed-bearing trees being left for the purpose In some places the practice of thinning out the growth is followed to give the new stock of seedlings the air and light they require. Lastly, sprouts or suckers from the stumps and roots of trees that have been cut are often used for restocking This method will apply mainly to such broad-leaved species as renew themselves in this way They should be cut while dormant This is about the only way employed in the reproduction of coppice woods (See COPSE) As a rule, the conifers do not sprout from their stumps Pruning and thinning must be given some attention Natural pruning is most satisfactory and will be done by the trees themselves if they are planted close enough In natural pruning the lower twigs and branches die because close planting prevents their obtaining sufficient light In time these dead parts are broken off and their stubs are buried by the trunk as it increases in girth Thinning, on the other hand, must be done from time to time so as to prevent overcrowding. When branches are cut off, the cut should be close to the main trunk, and where the wound is too large to heal over in a single year or possibly two, the cut surface should be protected against the entrance of fungi by painting it

Economic Returns. The financial returns from forests depend upon a number of factors, but in any case they are tardy. In copses the whole area may be cut over every 20 or 30 years, while forests grown for timber must of necessity be of greater age By conservative management, where the land is not too valuable at the beginning and markets are convenient, it is believed that 4 per cent can be realized in European forests, and there are records of even greater returns in the United States A 10-year-old plantation of hardy catalpa in Kansas is said to have yielded a net gain of $197 55 per acre, which sum could have been increased by continuing the marketing over a longer period

Since it has been shown that private holdings of forest areas can be so managed as to be a source of continual revenue without impairing the original capital, many large owners are availing themselves of the opportunity offered by the government to secure the aid of expert foresters in planning their management To provide experts schools of forestry have been established at Cornell and Yale universities, and forestry instruction is given in the agricultural and other colleges of a number of States

Climatic Influence The climatic influences of forests are very great Whether forests are actually instrumental in securing greater rainfall is somewhat problematical Observations covering a long period of years and a large extent of forest are not sufficiently abundant to determine this point That they do aid very materially in conserving moisture is not to be denied, and as a factor in the distribution of water they are equally important In tempering hot and cold winds and as wind breaks, they are of great importance The temperature in a forest is lower in summer and warmer in winter than in an adjacent tract, and this influence may be exerted to a considerable distance The use of forests as a means for reclaiming tracts of almost barren sand and for protecting regions against wind-shifted sand is well shown by some of the forests of France

Forest Enemies The worst enemy of forests is man, through the agency of destructive lumbering, forest fires, grazing of animals, especially sheep, insect attacks, and fungous diseases Mixed forests are not so subject to great loss from the last two causes as pure woods, since the same fungus or insect seldom attacks any great number of species of trees Consult Fernow, *Economics of Forestry* (New York, 1902), *History of Forestry* (Toronto, 1911), Gifford, *Practical Forestry* (New York, 1902), Green, *Principles of American Forestry* (ib, 1903), Brucken, *North American Forests and Forestry* (ib, 1908), Fron, *Sylviculture* (Paris, 1909), Forbes, *The Development of British Forestry* (London, 1910), Graves, *The Principles of Handling Woodlands* (New York, 1911), Allen, *Practical Forestry in the Northwest* (Portland, Oreg, 1911), Nisbet, *Elements of British Forestry* (London, 1911), Schlick, *Manual of Forestry* (ib, 1911), Hawley and Hawes, *Forestry in New England* (New York, 1912), Noyes, *Wood and Forest* (Peoria, Ill, 1912), *Reports of the Director of Forestry* (Ottawa, Canada) See ARBORICULTURE, FOREST

FORESTRY ASSOCIATION, AMERICAN. An association organized in 1882 and incorporated in January, 1897, with the following general objects (1) the promotion of a business-like and conservative use and treatment of the forest resources of the United States, (2) the advancement of legislation tending to this end, both by the States and the Congress of the United States, the inauguration of forest administration by the Federal government and by the States, and the extension of sound forestry by all proper methods, (3) the diffusion of knowledge regarding the conservation, management, and renewal of forests, the proper utilization of their products, methods of reforestation of waste lands, and the planting of trees The association accepts as members all who are interested in promoting the objects for which it is organized It has taken an important part in the movement for the conservation of the forest resources of the United States which characterize the first decade of the twentieth century It carries on an educational propaganda by which it enlists support in securing the proper use and conservation of the forests in every State of the Union, every province in Can-

ada, and every civilized or semi-civilized foreign country The association is generally recognized as the leading exponent of forest conservation in the Western Hemisphere In 1913, 11 committees investigated various forest conditions and reported at the meeting of the National Conservation at Washington in November of that year These reports represent the most advanced thought of theoretical and practical experts in forestry in the United States and Canada The membership of the Association is over 5000 It publishes a monthly magazine, *American Forestry*, which is the only national publication on forestry in the United States. The headquarters are in Washington, D C

FOREY, fô'rā', ELIE FRÉDÉRIC (1804–72) A French soldier He was born in Paris, was educated at Saint Cyr, accompanied an expedition to Algeria in 1830, was made a brigadier in 1848, aided Napoleon III in 1851—notably by clearing the Hall of Deputies of those who opposed the coup d'état—and in 1852 attained the rank of general of division He fought in the Crimean War and in the Italian campaign of 1859 and in 1862 went to Mexico as military and civil administrator and Minister Plenipotentiary He promised the Mexicans that their liberties should be preserved and their rights respected, but he sequestered the goods of many who were opposed to Maximilian. Puebla surrendered to him on May 17, 1863, after a long siege, and the city of Mexico was soon occupied, and a provisional government was formed Forey was accused of too great clericalism He was replaced by Bazaine, became a marshal in the same year, and soon afterward was given command of a corps d'armée He retired in 1867, after a stroke of paralysis

FORFAIT, fôr'fā', PIERRE ALEXANDRE LAURENT (1752–1807) A French engineer, born at Rouen In 1773 he was elected a member of the Academy of Rouen, in 1781 became an engineer in the French navy, and in 1787 was intrusted with the construction of packet boats running between France and the French colonies and to the United States In 1791 he was elected from Seine-Inférieure to the Constituent Assembly He was charged by Napoleon with the naval preparations for the invasion of Egypt and from 1799 to 1801 was Minister of Marine and the Colonies Subsequently he was appointed Councilor of State, and inspector general of the fleet designed to be employed in the invasion of England He was the inventor of the Seine boat, wrote many scientific papers, and published a *Traité élémentaire de la nature des vaisseaux* (1788)

FOR'FANG, or **FORE'FANG** (Sax *fore*, before, and *fangen*, to take) In old English law, the offense of buying up provisions, grain, etc, at a fair or market, before the King's purveyors were served with necessaries for his Majesty It is denounced in a charter of Henry I in 1133, but has long been obsolete The term "forfang" was also used in Anglo-Saxon law to describe the lawful recovery, by force and arms, of stolen or strayed cattle from a thief, or from those having illegal possession of them, as well as the reward fixed for such rescue.

FORFAR, fôr'fēr The county town of Forfarshire, Scotland, a parliamentary and royal burgh situated on the Loch of Forfar, 14 miles north-northeast of Dundee (Map Scotland, F 3) It has a courthouse, county hall with portraits by Raeburn, Romney, and Opie, a public library, and a public park. The county hall contains a curious relic, a witches' bridle, or gag for use on the way to executions Linen and jute are its staple manufactures, it also makes leather, rope, and iron castings Supposed to be the ancient Orrea, it was once the seat of the Scottish kings David I (1124–53) made it a royal burgh In 1308 Bruce destroyed the castle, and, according to Boece, Forfar by 1526 had dwindled to "a country village" Since the middle of the eighteenth century it has grown into a prosperous town Pop, 1901, 12,061, 1911, 12,254 In the neighborhood is Glamis Castle, the seat of the Earl of Strathmore

FOR'FARSHIRE, or **ANGUS** A maritime county in the East-Midland division of Scotland, bounded east by the North Sea, north by Kincardineshire and Aberdeenshire, west by Perthshire, and south by the Firth of Tay (Map Scotland, F 3) Area, 873 square miles The surface of the county is irregular, and intersected with hills, the Sidlaw being 1400 feet high, and Catlaw, the highest, 2264 feet The chief rivers are the Tay, North Esk, South Esk, and Isla Forfarshire is an agricultural county, raises sheep and cattle, and is also the chief seat of Scotch jute and linen manufactures Capital, Forfar, other important towns are Dundee, Montrose, Arbroath, and Brechin Pop, 1801, 99,000, 1901, 284,000, 1911, 281,417 Consult Warden, *Angus or Forfarshire* (4 vols, Edinburgh, 1880–83), and A Jervise, *Memorials of Angus and Mearns* (Edinburgh, 1895)

FOR'FEITURE. The loss of title to property, as a punishment for crime or other unlawful act Personal as well as real property is subject to forfeiture, and the penalty may be incurred for civil as well as for criminal offenses The forfeiture of lands was a penalty of the feudal law and was a direct consequence of the feudal relation of landlord and tenant This relation was primarily personal and confidential, the lord owing protection to his vassal, and the vassal being bound to the highest degree of loyalty and devotion to his lord As it was this feudal relation of interdependence which made the vassal a legal person (*homo legalis*)—i e, a member of society protected by the political organization of the state and its machinery of justice—so the rupture of this feudal relation by any disloyalty operated at once to render the tenant a man without law, a lawless man, or outlaw As he held his lands, his goods, and even his life on the condition of loyalty to this feudal bond, its breach naturally involved the forfeiture of these

Forfeiture for Crime The penalty of forfeiture for treason prevailed in England before the Conquest, as is clear from the fact that lands held in gavelkind, which is a Saxon tenure, may be forfeited for treason But after the Conquest forfeiture of lands and goods came to be regarded as the peculiar punishment of felony, of which treason against the sovereign was the highest kind, being denominated high treason, to distinguish it from all other felonies, which were called petty treason In cases of treason the offender forfeits all his lands absolutely to the crown Upon conviction of felony, according to the old law, the offender forfeited to the crown the profits of all estates of freehold—i e, life estates—during his life, and all his estates in fee simple for a year and a day, after which they escheated to the lord of whom they were

held. The crown during the year of occupancy was entitled to commit upon the lands what waste (q v) it pleased By Magna Charta this power of committing waste was restrained, but by 17 Edw II, c 16, the King's right to waste of forfeited lands was again recognized In all felonies the goods and chattels of the offender are, on conviction, forfeited to the crown, but forfeiture of the goods does not operate until conviction Where, therefore, a person has disposed of his goods before conviction, the crown cannot reach them Forfeiture of lands does not take effect until sentence of attainder (q v) has been pronounced So that a person committing *felo de se* (q v), or a rebel dying before sentence, or killed in open rebellion, does not ipso facto forfeit his lands But sentence of attainder, as soon as pronounced, has a retroactive effect, and annuls all conveyances made between the act of treason or felony and the pronouncing of sentence Conveyances made before the act of treason are not affected Hence a wife's jointure is not forfeited, because settled on her before the commission of the act The same thing is true of the wife's dower in all lands of which her husband was seised prior to the commission of the treasonable acts charged

Forfeiture for treason and felony is accompanied by *corruption of blood*, whereby the offender is incapable of inheriting any lands or of transmitting any title to an heir It was this doctrine which produced the escheat of forfeited lands, to which reference has been made above The tenant, having been cut off by his crime from all human relationships, his blood being corrupted—i e, bastardized and rendered illegal —by the attainder, has no lawful heirs to whom the lands can descend, and there being thus a failure of heirs, the land escheats to the lord of whom it is held. (See ESCHEAT) By 7 Anne, c 21, it was enacted that after the death of the Pretender and his sons no attainder for treason should operate to the prejudice of other than the offender himself, but this provision was repealed (39 Geo III, c 93) In 1870, however, the crown's claim of forfeiture was abolished in all cases but outlawry (Forfeiture Act 33 and 34 Vict, c 23, § 1), and in 1879 (42 and 43 Vict, c. 59, § 3) outlawry in civil cases was also abolished

In the United States conviction of felony has never been attended with forfeiture, and the penalty of forfeiture for treason is confined within narrow limits by the Federal and State constitutions See ATTAINDER

Civil Forfeiture Civil forfeiture may be incurred in England in five ways—viz, by tortious alienation, by wrongful disclaimer, by alienation in mortmain, by breach of condition, and by the commission of waste The first three of these modes were incidents of the feudal tenure of lands, the last two were introduced by statute It must be observed that, according to the earliest feudal customs, a gift of lands was always made in favor of a particular person, and that alienation, without consent of the overlord, involved a forfeiture of the fee. But this strictness having by degrees ceased to be observed, forfeiture was only incurred in case of a tortious alienation. Tortious alienation was where the owner of a particular estate conveyed by common-law conveyance, as feoffment, fine, or recovery, a greater estate than that to which he was himself entitled, as where a tenant for life made a feoffment in fee The immediate effect of this act was the forfeiture of the land to the remainderman or reversioner By 3 and 4 Wm IV, c 74, abolishing fines and recoveries, and 8 and 9 Vict, c 106, § 4, declaring that feoffment should not have a tortious operation, forfeiture by tortious alienation has ceased to exist (See FEOFFMENT) Forfeiture by wrongful disclaimer was where a tenant holding of a superior lord, on being summoned in any court of record, either disclaimed his allegiance or did any act which amounted to a disclaimer Since, excepting in a few ancient manors, all landowners in England now hold directly of the crown, this form of forfeiture is probably obsolete Forfeiture by alienation in mortmain is incurred by the conveyance of lands or tenements in favor of any corporation (q v), sole or aggregate, ecclesiastical or temporal As by vesting the land in a tenant of this description the overlord was deprived of all the duties and services due by his vassal, this act was declared by various acts of Parliament to involve the forfeiture of the lands (See MORTMAIN) Forfeiture of copyholds was incurred by committing waste, and by other acts of a wrongful kind inconsistent with the fealty due to the lord By the Statute of Gloucester (6 Edw I, 1278), the penalty of forfeiture was affixed to the commission of waste by any tenants for life or for years, as well as by guardians in chivalry (See WASTE) Forfeiture on breach of condition subsequent is where an estate is held upon a condition contained in the grant itself On failure of the condition the grantor or his heirs may enter upon the lands See CONDITION, ENTRY, RIGHT OF

In Scotland civil forfeiture may arise either from statutory enactment, at common law, or by agreement. By a Statute of 1597 it was enacted that vassals failing to pay their feu duties for two years should forfeit their right. This forfeiture must be established by an action to recover the feu duties in arrear and might be avoided by payment at the bar At common law a vassal forfeited his land by disclamation or purpresture The former is analogous to the English disclaimer and consists in the denial by a vassal of his lawful superior Purpresture was incurred by the vassal's encroachment on the streets, highways, or commonalties belonging to the crown or other superior These forms of forfeiture have long since fallen into disuse Forfeiture on special agreement depends wholly upon the terms of the condition inserted in the titles See FEE, FEUDALISM, IRRITANCY, TENURE

In the United States civil forfeiture is generally limited to acts of waste committed by tenants for life or years and to the breach of conditions upon which lands are granted, and in a few States even these have been abolished. But there are certain offenses in regard to which particular statutes have been enacted by Congress exacting the forfeiture of property employed as a means of committing the wrongful act or used in an unlawful transaction, but forfeiture in such cases applies only to the particular property designated, and not generally to chattels or lands, as in the other instances which have been maintained Thus, laws have been passed from time to time providing that smuggling or importation of goods under fraudulent invoices shall cause a forfeiture either of the entire invoice or of the property wrongfully imported Acts of piracy entail a forfeiture of

the piratical craft and its appurtenances The same was true of vessels engaged in the slave trade For forfeitures in war, see PRIZE

FORGÁCH, or FORGÁCS, fôr'gach A noble family of Hungary, which traces its origin to the time of King Stephen I —FRANCIS FORGÁCH (1530–75) was Bishop of Grosswardein (1556–67) He took part in the Council of Trent He afterward traveled to Italy and wrote *Rerum Hungaricarum Sui Temporis Commentarii Libri XXII, 1540–1572*, republished in 1866 by Major in the *Monumenta Hungariæ Historica* (vol xvi) The more recent members of the family include Count IGNATIUS FORGÁCH (1702–72), a general of ordnance under Maria Theresa, and Count ANTON FORGÁCH (1819–85), who held several offices under Ferdinand and Francis Joseph From 1861 to 1864 he was High Chancellor and was a stanch supporter of the old Conservative party and bitterly hated by the Nationalists, whose reforms he opposed. After 1869 he was deputy in the Hungarian Diet.

FORGE, FORGING (from OF *forge*, from Lat *fabrica*, workshop, from *faber*, smith) A forge is a furnace or open fire, commonly fitted with a bellows or air blast, for heating metal which is to be formed into special shapes by forging, forging is the process of hammering or pressing hot metal into special shapes for use in engineering and the arts Forges are made in all sizes, from the miniature gas-heating device used by jewelers to the great furnaces for heating steel ingots, armor plates, engine shafts, etc, weighing many tons, and they may be either fixed or portable Portable forges are usually constructed of metal and are of small size, they comprise a shallow pan or hearth for the fire, a bellows or fan for blowing the fire, and the hand or power mechanism for operating the blast-producing device Fixed forges are usually built of masonry with an interior lining of fire brick or other refractory material, and the blast is produced by power blowers

Originally forging was a hammering process solely, but with the advent of larger masses to be treated, and the consequent need for very heavy hammers if the effect of the blow is to reach the centres of such forgings, presses have come into use, especially for making heavy forgings of steel Forging by hammering may be done either by hand or by power Hand hammering or forging is usually confined to the production of small forgings or to finishing large forgings produced by power hammers The process is a simple one and is familiar to any one who has observed a blacksmith fashioning horseshoes or similar small articles Power forging by hammers is nothing more than the hand-hammering process accomplished by means of heavy hammers operated by steam or other power. (See HAMMER.) It is employed in the production of large forgings for engines and machinery Forging by presses consists in substituting for the power hammer, with its sudden heavy blow, a hydraulic press which squeezes the metal into shape by a comparatively slow, steady pressure Steel forgings for engine shafts, armor plates, etc, are usually made by pressing The process may be illustrated by tracing the operations conducted in forging a modern hollow steamship shaft. An ingot of open-hearth steel of proper chemical composition to give the necessary physical properties is cast approximately twice the size of the finished shaft The metal is then submitted, while liquid, to hydraulic pressure of 7000 tons, or thereabouts, until cold, great care being taken to cool the ingot slowly and equally on all sides to prevent strains or cracks from forming on account of unequal contraction When the ingot is cold, the sand from the mold which has adhered to it is cleaned off, and then, if intended for a small shaft, it is ready for the forging process proper If the shaft is to be of more than 12 or 14 inches in diameter, a hole is bored through the axis of the ingot The size of this hole varies according to the size of the shaft and the service to which it is to be eventually subjected Generally speaking, however, it is made from one-third to two-fifths the diameter of the finished shaft The first operation in the process of forging is the reheating of the ingot This is a very delicate operation Great care must be taken to insure a slow and uniform penetration of the metal by the heat, as there is otherwise danger of expanding the surface metal so rapidly that it will crack away from that underneath, which has not been heated to the same temperature The hole in the centre of large ingots allows the interior and exterior to heat up and expand together, thus relieving this tendency to crack When the ingot is heated, it is forged into shape under a slow-moving hydraulic press of from 2000 to 5000 tons' capacity instead of the rapid steam hammer of from 5 to 25 tons' falling weight In the case of the hollow ingot a steel mandrel is inserted, of a size to fit loosely into the hole, and the metal is forged down in the same manner as is employed with a solid shaft. Generally the shaft, if very long, has to be reheated one or more times during the forging The finishing process consists in annealing or tempering the shaft, when it is ready to be machined

Many small articles of common use are forged by machinery Balls, screw and rivet blanks, nuts, nails, etc, are among the more familiar machine-forged articles In general the process consists in inserting steel bars, heated to the proper temperature and of suitable cross section, into a machine automatically operating, which cuts off the proper lengths and stamps or presses them into shape between dies The process is a continuous one, one heated rod being inserted after another as fast as the machine will handle them Many articles of intricate pattern are drop-forged In this process an upper and a lower die are employed The lower die is placed on the anvil of a drop hammer, the heated piece of metal placed on it, and the upper die descends on top of the heated metal A hammer falling from a height carries the upper die and thus stamps the plastic metal into shape between the dies Drop hammers are made of various sizes, the largest now in operation has a 3000-pound hammer A very large proportion of the shapes used in the motor vehicle for levers, treadles, connecting rods, and the like are drop-forged They would once have been either cast and malleableized or hand-forged with entailed cost of manufacture Shaping or pressing of steel plate in dies is a forging process and is done by heavy power-driven presses A shaping process carried on without heat is not properly a forging process See IRON AND STEEL

FOR'GERY (Fr *forger*, to form metal into shape, to fabricate) The *crimen falsi* of the

Roman law is held in English common law to be the fraudulent making or altering of a writing or seal, to the prejudice of another man's right, or of a stamp to the prejudice of the revenue As regards writings, the instrument forged must be executed with such skill or in such circumstances as to be capable of being mistaken for a genuine document by a person of ordinary intelligence and observation It is not necessary that there should be an attempt at imitation of the handwriting of another or of the form of the simulated document If there was intention to deceive, and the circumstances were such as to render deception possible, the crime has been committed, and consequently it is possible to forge the name of a person who cannot write Any material alteration, however slight, is a forgery just as much as the subscription of the name of the pretended maker, or the fabrication of the entire writing It will not lessen the crime, though the whole writing should be genuine, the name only being forged, or the name being really the handwriting of the party to whom it belongs, but appended to a forged writing Even if the name be a fictitious one, but appended for the purpose of deceiving, a forgery has been committed The offense is not limited to the fabrication of writing, using that term in its literal sense It includes the fabrication of printed or engraved instruments, such as railroad tickets, corporation certificates, bonds, etc Falsely painting an artist's name on a picture is not forgery, however, for the picture is not a document or writing Moreover, the document fabricated must have an apparent legal efficacy A letter of introduction, though requesting a personal favor for the bearer from the one to whom it is addressed, is not a subject of criminal forgery, as it does not purport to confer any legal right or to impose any legal duty At common law forgery is a felony punishable by fine and imprisonment, or both

To secure a conviction for forgery it is necessary to prove an intent to defraud, but it is not necessary that the purpose should have been actually effected, it is sufficient to show that the forgery would have proved injurious to another's interests The different State laws in this country generally define specific offenses as constituting the crime of forgery, but these laws do not materially change the character of the offense at common law, but simply provide a special and increased punishment in such cases as they particularly enumerate Consult Stephen, *Digest of the Criminal Law* (4th ed, London, 1904), Osborn, *Questioned Documents* (Rochester, 1910), and the bibliography under CRIMINAL LAW

FORGET, fôr'gā', AMÉDÉE EMMANUEL (1847–) A Canadian statesman, born at Marieville, Province of Quebec, and educated at Marieville College Admitted to the bar in 1871, he practiced in Montreal, but later he went West, and became private secretary to the Lieutenant Governor of the Northwest Territories (1876), clerk of the Legislative Assembly, Regina, Saskatchewan (1888), and Assistant Commissioner of Indian Affairs for Manitoba and the Northwest Territories, and in the government of the latter was a member of the Council of Public Instruction (appointed 1893), Indian Commissioner (1895–98), and Lieutenant Governor (1898–1905) In 1905–10 he was Lieutenant Governor of Saskatchewan and in 1911 became a member of the Dominion Senate He was elected vice president of the British Empire League and of the Dominion Forestry Association

FORGET, SIR JOSEPH DAVID RODOLPHE (1861–) A Canadian capitalist and legislator He was born at Terrebonne, Province of Quebec, and was educated at Masson College there He early engaged in business and in 1890 joined the Montreal Stock Exchange, after which he rapidly acquired a fortune and became president of, or a director in, a large number of financial and industrial corporations In 1908–11 he was chairman of the Montreal Stock Exchange, in 1911 he founded La Banque Internationale du Canada, of which he became president, and he also headed an important merger of Canadian navigation interests In 1907 he was appointed honorary lieutenant colonel of the Sixty-fifth Carabiniers Elected (1904) an Independent Conservative member of the House of Commons, in 1911 he declined a seat in the Conservative cabinet of Premier R L Borden In 1912 he was knighted

FORGET-ME-NOT (*Myosotis*) A genus of annual or biennial herbs of the family Boraginaceæ with small, generally blue flowers The genus is distributed over the temperate zones in all quarters of the world, and a number of species are common in America, growing chiefly in ditches and damp meadows *Myosotis scorpioides* and the closely related *Myosotis laxa* have crooked, creeping perennial roots, an angular stem 1 to 2 feet in height, and calyx covered with appressed bristles *Myosotis sylvatica*, with calyx covered with stiff spreading hairs, grows in bushy places and woods and is often planted in flower gardens It is especially admired for the size and brilliancy of its flowers The dark-blue forget-me-not of the Azores (*Myosotis azorica*) is cultivated in Europe, but requires the greenhouse The genus is a favorite with most persons, both because of the brilliancy of the flowers and because it is generally regarded as the emblem of friendship The English name, scorpion grass, is now seldom heard The German name, *Vergissmeinnicht*, corresponds with the English, forget-me-not *Myosotis versicolor*, very common in Great Britain, often as a weed in gardens, and naturalized in the eastern United States, is remarkable for the change of color in the very small flowers, which are first yellow, then blue Some species occur in such great abundance in parts of Alaska as to color the hillsides *Myosotis virginica* is rather abundant in dry places of the eastern United States during May and June

FORK (Fr *fourchette*, Ital *forchetta*, AS. *forc*, Lat *furca*) An instrument with two, three, or four prongs, and a handle, that serves to hold food while it is being cut and also to convey food to the mouth The common use of individual table forks is European and comparatively modern The Chinese and the Japanese eat with chopsticks, pencil-shaped objects that they hold in one hand and wield like a pair of tongs The Greeks and the Romans ate with their fingers, as primitive and half-civilized peoples still do During the periods of transition from fingers to forks knives were used for eating as well as cutting and still are by the lower classes But with the development of the wide, flat, four-pronged silver fork, polite society has decided that the fork and spoon alone may be brought to mouth, and the

use of fingers or knives is regarded as inelegant According to the Italian priest and scholar Peter Damiani, who lived in the eleventh century, individual table forks were first introduced into Venice by a Byzantine princess and from Venice spread through the rest of Italy In France table forks appear for the first time in an inventory of Charles V dated 1379, and as late as the sixteenth century the court use of forks to eat with was satirized as a novelty In French and Scottish convents forks were forbidden as sinful Into England forks are said to have been introduced by Thomas Coryate, who visited Italy in 1608, but as late as the revolution of 1688 few English noblemen owned more than a dozen At first table forks had only two prongs, later three, and four only towards the end of the seventeenth century, The carving forks used in Italy in the sixteenth century are illustrated and described in a fascinating volume, published in Venice in 1593, entitled *Il Trinciante* (The Carver) Consult Paul La Croix, *Manners, Customs, and Dress during the Middle Ages* (London, 1874), and W G Sumner, *Folkways* (New York, 1907) See CUTLERY

FORK'BEARD (so called from the apparent bifurcation of the ventral fins) A British hake (*Phycis blennoides*), also called hake's dame (q v), the ventral fins of which are long and filamentous.

FOR'KEL, JOHANN NIKOLAUS (1749–1818) A German writer on music He was born at Meeder, Saxe-Coburg, was organist to the University Church in Gottingen, and later director of music at the university Though he acquired considerable reputation as organist and harpist, his chief interests were the theory and the history of music Noteworthy are his *Allgemeine Geschichte der Musik* (2 vols, 1788–1801), and *Allgemeine Litteratur der Musik, oder Anleitung zur Kenntnis musikalischer Bucher* (1792), the first bibliographical work of its kind

FORK'TAIL. A name applied to various birds having noticeably forked tails, as the scissor-tailed flycatcher (see Plate of FLYCATCHERS) or a kite Specifically it denotes a group of black-and-white insectivorous birds of moderate size, inhabiting mountainous regions from northern India to Borneo, which have long forked tails kept incessantly in motion They constitute the genus *Hemicurus* and place their nests beside a stone or log, near the edge of small streams

FORLÌ, fôr-lē' (ancient *Forum Livii*) The capital of the Province of Forlì, in central Italy, on the right bank of the Montone, 40 miles southeast of Bologna (Map Italy, D 2) The town lay on the ancient Æmilian Way (q v) In the churches of Santi Biagio e Girolamo and San Mercuriale, named after the first Bishop of Forlì, are the tomb of Barbara Manfredi, paintings by Palmezzano and others and, in the choir stalls, fine wood carving by Alessandro dei Bigni The imposing cathedral of Santa Croce has been almost entirely rebuilt since 1844, but the dome has fine frescoes of the Assumption by Carlo Cignani The church of San Mercuriale has an imposing campanile The collection of paintings in the municipal art gallery contains a fresco by Melozzo da Forlì The citadel, built in 1361 by Cardinal Albornoz, is now used as a prison Forlì has a town hall, a lyceum, a seminary, a technical institute, a technical school, a library, and a hospital (founded in 1636) It markets grain, wine, cattle, silk, and hemp, and manufactures machinery, silk goods, hats, pottery, and furniture It is the seat of a bishop The ancient Forum Livii is said to have been founded by and named after Livius Salinator, in 207 B C, after his victory over Hasdrubal in the battle of the Metaurus (See HASDRUBAL, 3, FOSSOMBRONE) Early in the Middle Ages it was part of the Exarchate of Ravenna It changed masters during the struggles of Guelphs and Ghibellines, and was annexed to the Papal States in 1504 by Julius II Pop (commune), 1901, 43,708, 1911, 45,994 Melozzo da Forlì, the painter, and Flavio Biondo, the Renaissance topographer, were natives of Forlì Consult Baedeker, *Central Italy* (15th Eng. ed, Leipzig, 1909)

FORLÌ, MELOZZO DA. See MELOZZO DA FORLÌ

FORM 1 For perception of form, see FIGURE 2 **Form of Combination** A proposed rendering of the German *Gestaltqualitat*, or quality of form Some psychologists find it necessary to postulate a form of combination as a distinct mental attribute or content They say, e g, that a square is more than four linear extensions, sensibly of the same length, and occupying certain relative positions in the visual field, a square is a square, and squareness is a new character common to all squares, but not to be explained by attention, or by the laws of sensory connection, or by those of imaginal supplementing. A melody, again, is more than rhythm and consonance and scale, a melody is melodic, we recognize its melodic nature as such, the melodic character is something new and unique, common to all melodies, but not found elsewhere. Hence, they argue, "the presentation of a form of synthesis is as distinct from the presentation of the elements combined, considered apart from their union, as the presentation of red is distinct from the presentation of green"

As against this position, two things may be said 1 It betrays a confusion of the analytic and genetic points of view The "square" and the "melody" are given as perceptions, the psychological task is, then, to analyze these given perceptions and to formulate the laws under which the elementary processes combine, how these particular processes came to mean "square" and "melody" is another question Furthermore (2), there are psychologists who on the basis of their own observations are unable to identify the form of combination as a distinct mental attribute or content, and if there are cases where a perception resists analysis, they believe it the better plan to suspend judgment while awaiting more refined methods. Consult Mach, *On Analysis of the Sensations* (Chicago, 1897), Stout, *Analytical Psychology* (London and New York, 1902), Bentley, "The Psychology of Mental Arrangement," in *American Journal of Psychology* (Worcester, 1902); Titchener, *Text-Book of Psychology* (New York, 1910)

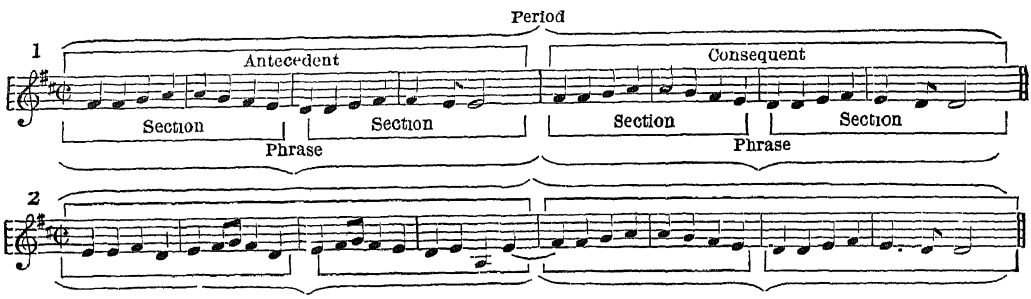
FORM (Lat *forma*, shape). In botany, the unit of ecology, as the species is the unit of classification or taxonomy The term is often used in expressions such as "life form," "plant form," etc See ECOLOGY, TAXONOMY.

FORM. In music, that element which unites all the various parts into an harmonious whole It is essential that these various parts should have some intimate relation to one another,

otherwise they would only be loosely strung together and could never represent artistic unity Musical unity is attained by various means, such as the repetition of musical motives or phrases, the maintaining of a certain rhythm or figuration, the choice of a fixed tonality Dissonant or contrasting elements are not excluded, but they must be resolved into a higher unity The germ of all musical form is the two-measure motive, or *section* A combination of two sections forms a *phrase*, of two phrases a *period* The first two phrases constitute the *antecedent*, the last two the *consequent* This is shown by the following example (1) from Beethoven To this period Beethoven adds another one (2) similarly constructed, and standing to the first in the relation of consequent to antecedent These two periods together constitute what is known as the simple *Liedform* Symmetry is one of the most essential features of all musical works, and a composition is unintelligible unless its themes are so arranged that the architectonic structure of the whole presents perfect symmetry The three fundamental forms are the liedform, sonata form, and rondo form The grouping of the themes in these forms is

I Liedform A—B—A

II Sonata form [A (key of tonic), B (key of dominant)] $\frac{A}{B}$—A—B (in key of tonic)



III Rondo form (*a*) with two themes A—B—A (in key of B), B (in key of A)—A, (*b*) with three themes A—B—A—C—A—B—A The second and third time A appears in keys different from the original

These forms admit of considerable variety, and the great masters, especially Beethoven and Brahms, have been inexhaustible in ingenious combinations of themes No definite rules can be laid down in this respect, anything is permissible that does not destroy the symmetry of the whole. In cyclical compositions symmetry between the various movements is maintained by the proportion of the various movements to one another, the relation of their keys, the alternation of slow and fast tempo, and sometimes also the introduction of a theme from a previous movement (Beethoven, Symphony No. 9) See CYCLICAL FORMS

Instrumental forms were originally developed from simple vocal forms Their development has been the slow product of centuries Simple dances were united in the suite (q v), which gradually developed and evolved the sonata. From the stringing together of madrigals arose the original *dramma per musica*, which became the *opera* (q v) and culminated in the *musical drama* (q.v.). For a careful study of musical forms, consult Lavignac, *Music and Musicians*, translated from the French by Marchant, with additions by Krehbiel (4th ed, New York, 1903) Consult also E Pauer, *Musical Forms* (London, 1880), L Bussler, *Musikalische Formenlehre* (Berlin, 1878), H Riemann, *Katechismus der Kompositionslehre*, part ii (Leipzig, 1904), M H Glyn, *Analysis of the Evolution of Musical Forms* (New York, 1909) See CYCLICAL FORMS, FUGUE, LIED, RONDO, SONATA, SYMPHONY

FORM. In philosophy, a term used by Plato (Gk ἰδέα, εἶδος) to express the reality of a thing, that which, besides the material of which it is composed, makes it what it is, and which is permanent, in contrast with appearances and objects of sensation that pass away and are altered as they pass The metaphysical character of Plato's forms, or ideas, has been the subject of much dispute, the question being whether Plato conceived them as having an existence in independence of the world of sense, or whether they were not for Plato very much what laws of nature are for the modern scientist Aristotle gave the authority of his great name to the former interpretation, which has thus become traditional Aristotle himself used the word *form* (εἶδος) as expressing the essence of a thing, and this meaning became current in scholasticism especially in the expression "essential form" Bacon used the word *forms* in the sense of "the laws and modes of action which regulate and constitute any simple nature, such as heat, light, weight, in all kinds of matter susceptible of them, so that the form of heat and the law of heat, or the form of light and the law of light, are the same thing" But Bacon did not succeed in keeping the term free from scholastic connotation, even in his own use of the word Kant used the term to designate any principle of arrangement or organization, supplied by the mind to the materials of sense. Kant recognized two perceptual forms, *space* and *time*, and four classes of conceptual forms, which he called categories. In this sense form is subjective, i e, it is not a characteristic belonging to an object as it exists in independence of experience, but only as it appears in experience. Hegel pointed out the impossibility of thus separating the objective and the subjective

FORMAL/DEHYDE, H CHO A compound of carbon, hydrogen, and oxygen, discovered by A W Hofmann in 1867 It is the simplest of the class of aldehydes (q v) It is obtained by the oxidation of wood alcohol Dry air, saturated with the vapor of wood alcohol, is passed over a superficially oxidized spiral of copper gauze, inclosed in a long glass tube The products of the reaction—the vapors of formaldehyde and water—pass out of the glass tube into empty receivers, in which the water vapor con-

denses to liquid water, and the latter dissolves much of the formaldehyde vapor, the result being a 35-per cent solution of formaldehyde in water Such formaldehyde as passes unabsorbed through these receivers is taken up in water, forming more—this time weaker—aqueous formaldehyde.

Attempts to condense formaldehyde vapor alone, without water, have invariably failed, the isolated compound undergoing chemical transformations with great rapidity Formaldehyde solutions, known commercially under the name of *formalin*, are used as antiseptics and disinfectants, in the manufacture of certain dyes, etc Subcutaneous injections of formalin have been proposed as a remedy for septicæmia, but the possible value of the drug is more than counterbalanced by its highly poisonous nature In this connection it may be interesting to note that, while formaldehyde itself is poisonous, its compound with acid sodium sulphite, $CH_2(OH)SO_3Na$, whose properties resemble to some extent those of formaldehyde itself, is harmless With ammonia formaldehyde reacts to form a compound known as hexamethylene-tetramine, $(CH_2)_6N_4$ This reaction permits of determining analytically the amount of formaldehyde in a given solution When heated with phenol (carbolic acid), in the presence of a base, formaldehyde enters into reaction, the product being a valuable substance known as *bakelite* (q v), which is used as a substitute for hard rubber, celluloid, horn, amber, ivory, and similar materials With casein formaldehyde forms a bone-like substance known as *galalith*

Formaldehyde has formed the starting point in the modern synthetic work on the sugars (q v) If allowed to stand for some time in the presence of weak alkalies, it is transformed into a mixture of simple sugars known as "formose" and including ordinary fructose ("lævulose") It is probable that in the transformation by plants of atmospheric carbonic acid into complex carbohydrates, such as the sugars and starch, the production of formaldehyde is the first step Formaldehyde itself has never been found in plants and would probably kill them if produced in considerable quantities But possibly every trace of formaldehyde undergoes chemical change as soon as formed See FORMIC ACID Consult J E Orloff, *Formaldehyd* (Leipzig, 1909), and L Vanino, *Der Formaldehyd* (Vienna, 1901)

FORM'ALIN. See FORMALDEHYDE.

FOR'MAN, HARRY BUXTON (1842–). An English author, born in London He entered the civil service in 1860 and became assistant secretary in the general post office and comptroller of packet services He is best known as a scholarly and discriminating editor, notably of Shelley (London, 1876–80) and Keats (ib, 1883) His work, editorial and other, also includes *The Letters of Keats to Fanny Brawne* (ib, 1878), *The Shelley Library* (ib, 1886), *E B Browning and her Scarcer Books* (ib, 1896), *The Books of William Morris* (ib, 1897), *Letters of Edward John Trelawney* (ib, 1910), *Note Books of Shelley Decyphered* (ib, 1911), *Medwin's Life of Shelley, Enlarged and Fully Commented* (ib, 1913)

FORMAN, JUSTUS MILES (1875–1915). An American author, born at Le Roy, Genesee Co, N Y He graduated from Yale University in 1898 and then studied painting for three years in Europe Besides more than 100 short stories published in the popular magazines, he is author of *The Garden of Lies* (1902), dramatized in collaboration with Sydney Grundy and played in London in 1904-05, *Journey's End* (1903) *Monsigny* (1904), *Tommy Carteret* (1905), *Buchanan's Wife* (1906), *A Stumbling Block* (1907), *Jason* (1909), *Bianca's Daughter* (1910), *The Unknown Lady* (1911), *The Court of the Angels* (1912), *The Opening Door* (1913), *The Blind Spot* (1914), *The Six Rubies* (1914) He died on the *Lusitania*

FORMAN, SIMON (1552–1611) A notorious English astrologer and quack doctor He claimed to have discovered his marvelous powers in 1579 and thereafter practiced as a quack Strangely enough, he received later (1603) the degree M D from Jesus College, Cambridge At this time he was engaged in a most scandalous practice among the ladies at court, with love philtres and wax images Besides his *Grounds of the Longitude* (1591), he left behind him a mass of manuscripts, small parts of which have been published, as the *Diary* from 1564 to 1602 (J. O Halliwell-Phillipps, 1843), and extracts from the *Book of Plays* (Halliwell-Phillipps, Folio Shakespeare, 1853-65), giving the dates of performances at the Globe Theatre of *Macbeth* (April 20, 1610) and *Winter's Tale* (May 15, 1611).

FOR'MA PAU'PERIS, IN (Lat, in the character of a poor person) The phrase usually employed in both England and America when a person arranges to conduct an action in such a way as to avoid certain expenses because too poor to sue in the ordinary way In England, the statutes 11 Hen VII, c 12, and 23 Hen VIII, c 15, provide that such as will swear themselves not worth £5 except their wearing apparel and the matter in question in the cause, shall be exempt when plaintiffs, but not when defendants, from the payment of court fees, and shall be entitled to have counsel and attorney assigned to them by the court without fee They are further excused from costs when unsuccessful, a privilege which, according to Blackstone, amounted in former times only to the rather uncomfortable alternative of choosing between paying and being whipped In the event of success, however, a person suing in this form is entitled to his costs, because his counsel and agent, and the officers of court, though they are bound to give their labor gratis to him, are not bound to give it on the same terms to his antagonist, unless he too be a pauper To prevent the abuse of suing in the superior courts at Westminster in this form in matters of small amount, it is provided (19 and 20 Vict, c 108, § 30), subject to certain exceptions, that any plaintiff who resorts to one of these, in a case falling within the cognizance of a county court, and recovers no more than £20, or in some cases £5, shall have no costs, unless he satisfies the court or a judge that he had sufficient reason for taking that course

In Scotland this benevolent arrangement was introduced by statute more than half a century before the date of the English act above mentioned

Similarly, actions *in forma pauperis* may be prosecuted in all of the United States The provision is deemed a part of the common law of the several States, derived from the English system of administering justice, though it is now in many States governed by statute

FORMATES See FORMIC ACID.

FORMA'TION (Lat *formatio*, from *for-*

mare, to shape, from *forma*, shape) In botany, a widespread assemblage of plants with similar life relations, whose presence is determined by climatic factors—e g, one may speak of desert formations or tropical evergreen forest formations A second use of the word applies to an assemblage of similar plant associations or of plant associations in similar habitats, e g, all the peat-bog associations of a region taken as a whole make up the peat-bog formation of that region, or the associations occurring upon sandstone constitute the sandstone plant formation of the region The formations first described would be called climatic, in contrast to the more restricted edaphic formations, such as those of the peat bog See ECOLOGY, DISTRIBUTION OF PLANTS

FORMATION In geology, a group of strata united by some common characteristic, such as age, origin, or composition It is loosely employed and may be synonymous with any of the stratigraphic divisions—e g, coal formation (Carboniferous system), Canadian formation (Canadian series), etc

FOR'MA URBIS ROMÆ (Lat, shape of the city of Rome) A famous map of Rome engraved on marble and affixed to the outer wall of the so-called Templum Sacræ Urbis (now the church of SS Cosma e Damiano) This map is known also as the Marble Plan or as the Capitoline Plan Between 1559 and 1565 many pieces of this plan were found at the foot of the wall of the temple and came into the possession of the Farnese family In 1742 such of these fragments as remained were put in the Capitoline Museum Other portions were found in 1867 and in 1884, in 1888 over 180 small pieces were found From 1891 to 1901 about 425 more pieces were discovered All these pieces are in the Museum The map represents the plan of the city and some of the suburbs as reconstructed under Severus and Caracalla, after the fire of Commodus, and replaced a previous map made under Vespasian The fragments have been of great help in identifying existing ruins Consult Platner, *The Topography and Monuments of Ancient Rome* (2d ed, Boston, 1911), and the references there

FOR'MEDON An ancient form of action, in the law of England, belonging to the class of real actions, whereby the heir in tail, or the reversioner or remainderman who had been ousted by a discontinuance, was entitled to vindicate his claim to the lands from which he had been ousted By 21 Jas I, c 16, it was enacted that writs of formedon should be brought within 20 years after the cause of action arose The writ of formedon is now abolished, simpler and more convenient forms of action for the recovery of lands having been substituted therefor. It has never been employed in the United States

FORMENTERA, fôr'mân-tā'rā. One of the Balearic Islands, in the western part of the Mediterranean (Map Spain, F 3) It is a part of the Spanish Province of Baleares The island has an area of 38 square miles Pop, 1900, 2295, 1910, 2600 Wheat is grown, cattle raising, fishing, and salt working are other occupations Formentera was taken by Aragon in 1232

FORMER AGE, THE A poem by Chaucer, a metrical version of part of his translation of Boethius. It was discovered by Bradshaw, and published by Morris in 1866

FORMIA, fôr'mê-a (ancient *Formiæ*, later known as Mola di Gaeta, later still called Formia) A city of the Province of Caserta, in south Italy, beautifully situated on the north shore of the Gulf of Gaeta, 68 miles by rail northwest of Naples The lower slopes of the mountains that rise behind it are covered with groves of olives, lemons, oranges, and pomegranates It lay on the ancient Appian Way and once held the summer homes of many wealthy Romans The entire surrounding country is dotted with the remains of homes and public works of the Romans, who took advantage of the mild climate and the view towards the distant Bay of Naples The so-called Villa of Cicero, or Villa Caposele, formerly the favorite summer residence of the kings of Naples, contains two well-preserved ancient *nymphæa* of Doric architecture These remains belong to the first or second century A D There is some coasting trade The town makes pottery and oil Pop (commune), 1901, 8108, 1911, 8734

FORMIÆ See FORMIA

FOR'MIC ACID (from Lat *formica* ant), CH_2O_2 The simplest and one of the earliest known of the so-called fatty acids of organic chemistry It derives its name from the circumstance of its having been first obtained from the *Formica rufa*, or red ant, by Rey, in 1670 In a concentrated state it is a fuming liquid with an irritating odor and causes vesication if dropped upon the skin If pure, it solidifies at moderately low temperatures, forming a crystalline mass that melts at 8 3° C It boils at a slightly higher temperature than distilled water, yielding a vapor that burns with a blue flame It is a powerful antiseptic and acts chemically as a reducing agent, e g, readily reducing the salts of silver, mercury, platinum, and gold It may be obtained in various ways For example (1) by the distillation of red ants with water; (2) by the action of acids or alkalies upon hydrocyanic acid, (3) by the oxidation of various organic substances, such as sugar, starch, wood alcohol, etc, (4) by the action of alkalies upon chloral or chloroform, (5) synthetically (Berthelot), by keeping carbonic oxide gas for a prolonged period in contact with potassium hydroxide at a temperature of 100° C Kolbe and Schmitt obtained it also by the reduction of carbonic acid—a reaction of great importance, as it suggests a possible explanation of the process by which the transformation of carbonic acid into complex organic substances is effected in the organism of plants, for, since formic acid itself is a very common product of the oxidation of organic bodies, it is easy to conceive how such bodies may be formed in plants by a reversed process—i e, by the reduction of formic acid and hence of carbonic acid

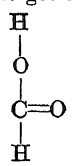
The most convenient method of preparing formic acid consists in gradually adding crystallized oxalic acid to anhydrous glycerin at a temperature slightly above 100° C, oxalic acid decomposing into formic and carbonic acids according to the following equation

$$\underset{\text{Oxalic acid}}{C_2H_2O_4} = \underset{\text{Formic acid}}{CH_2O_2} + \underset{\text{Carbonic acid}}{CO_2}$$

In the animal organism formic acid occurs not infrequently, either free or in combination, thus, it is found not only in ants, but in the poison of the bee and wasp, and in the hairs of the procession caterpillar It has also been detected in sweat, in the expressed juice of the spleen.

pancreas, thymus gland, and muscles, in the brain, the blood, and the urine

The salts of formic acid, called *formates*, or *formiates*, are crystalline substances, soluble in water, and, if heated above 400° C, readily transformed into salts of oxalic acid Chemically formic acid is both an acid and an aldehyde, its molecule containing both the acid group COOH and the aldehyde group CHO



Formic acid

and it is to the presence of the latter group in its molecule that formic acid owes its reducing properties Formic acid is used as a food preservative and in brewing as an antiseptic In conjunction with certain mordants it is also used as a reducing agent in dyeing See ALDEHYDES

FORMICA'TION (Lat *formicatio*, from *formicare*, to crawl like an ant) A peculiar sensation of partial numbness and tingling of the skin, such as might be produced by the creeping of ants or other small insects over the surface It is one of the forms of disordered tactile sensation, or paræsthesia, and resembles the awakening from numbness or from a limb being "asleep" It is sometimes a symptom of spinal disease It may be due to pressure on a nerve or to poisoning by aconite, in the latter case the feeling is experienced in the tongue and cheeks It sometimes is a symptom of hysteria

FORMICIDÆ, fôr-mĭs'ĭ-dē (Neo-Lat nom. pl, from Lat *formica*, ant) The ant family, sometimes regarded as a superfamily (Formicoidea) See ANT, *Social Insects*, under INSECT.

FORMIGÉ fôr'mē'zhā', JEAN CAMILLE (1845–) A French architect, born at Bouscat (Gironde) He studied architecture under J C. Laisné and prepared for the government a series of plans and restorations of various public buildings, including the famous Roman Theatre at Orange In 1885 he became architect of streets and parks at Paris He constructed the buildings of Liberal Arts and Fine Arts at the Exposition of 1889 and of Rumania at that of 1900 He became an officer of the Legion of Honor and also of the Academy

FORMO'SA A Territory of Argentina, South America, occupying the northeast portion of the Republic, and lying between the rivers Pilcomayo and Bermejo (Map Argentina, H 2) It borders on Paraguay on the northeast and east, the Chaco Territory on the south and west, and the Province of Salta on the northwest The area is estimated at 41,402 square miles It is a part of the great Chaco plain, having an elevation of about 350 feet The surface is level, well watered, and covered with forests The interior is inhabited by uncivilized Indians and is unexplored. The chief products are sugar cane and tobacco. Pop., 1912, 17,232. The capital is Formosa, on the Paraguay River, with about 6000 inhabitants. The town was founded after General Victorica defeated the natives of the Chaco in 1884–85

FORMO'SA A large and important island of the western Pacific, which formed part of the Empire of China until 1895, when it was ceded to Japan by the treaty concluded at Shimonoseki (q v) (Map Japan, D 8) With the adjoining group of 47 islands known to foreigners as the Pescadores (q v), ceded by China to Japan by the same treaty, it forms a province of the Japanese Empire under the name of Taiwan

Topography. Formosa lies off the east coast of China, opposite the Province of Fukien, from which it is distant about 90 miles It stretches in a general northeast to southwest direction from lat 25° 15′ to 20° 56′ N, and extends east and west from long 120° to 122° E Its length is about 235 miles, and its greatest breadth 90 miles, estimated area, 13,841 square miles Its shape is that of a long oval running to a point known as South Cape Forty miles east of this lies the island of Bôtel Tobago, and a little farther north the small island of Samasana Formosa is regarded by some as a link in the chain of volcanic islands which form the eastern escarpment of a former Malayo-Chinese continent Along the greater part of the west coast facing China the water is shallow, while on the east coast deep water is found at once

Throughout almost the entire length of the island, but nearer the east coast than the west, runs a great chain of forest-clad mountains, with peaks ranging from 7000 to nearly 15,000 feet in height The two highest are Mount Morrison, called Mukang Shang by the Chinese, which the Japanese renamed Niitaka-yama, 14,270 feet, and Mount Sylvia, which they call Setsu-zan, 12,480 feet East of this massive backbone the country is mountainous, abruptly terminating in a precipitous coast and a few small rocky islands Some of the cliffs present a sheer descent of from 3000 to 6000 feet. To the west of this mountainous region lies a range of low, barren clay hills, and to the west of this is a broad alluvial plain stretching from north to south, intersected here and there with water channels, terminating in sand banks and long muddy spits, the whole coast presenting a remarkable contrast to the bold rocky face of the east The land on the west side is regularly gaining on the sea, owing, no doubt, to the sediment brought down from the mountains by the watercourses, especially during the rainy season, when travel in some parts of the interior is rendered almost impossible

Climate. Except in the north, the climate during the winter is delightful The excessive rainfall of the north, and especially in the neighborhood of Kelung, makes it unpleasantly cold, though the temperature is generally higher than in the same latitude on the mainland of China At Tainan the atmosphere is said to be clear and bracing On the whole, however, the climate is very trying to many. The temperature seldom rises to 100° F, but the general humidity renders even a moderate degree of heat very enervating

Fauna As Formosa is included within the "Oriental" zoogeographical region, formed to include the Indo-Chinese coast and the Malayan and Chinese islands, the general characteristics of its fauna will be found under the title ORIENTAL REGION The island has not been thoroughly explored by naturalists, though Swinhoe and others have done much investigating Its denizens are largely the same as those of the adjacent mainland, showing that there formerly was a land connection That the separation occurred comparatively long ago, however, is probable from the fact that the island possesses a goodly number of peculiar species, though very

few, if any, are of a peculiar genus The main departures have been in small forest-keeping birds and such small mammals as moles, flying squirrels, and mice, though a special species of goat antelope or "serow" (*Nemorhœdus swinhœi*) has been developed in the mountains, and one of a forest deer (*Cervus taevanus*), allied to Chinese and Japanese species, which the natives have half domesticated The tiger seems never to have reached Formosa, where the largest beast of prey is the beautiful "clouded tiger" (*Felis macroscelis*)

Mining The interior has been but little explored and little is known of the geology of the island Gold is found in the streams, but nearly all the gold is obtained from quartz The output of gold in 1909 was 160,000 momme Bituminous coal abounds in over two-thirds of the island, and the best-known mines are situated near Kelung and are worked under foreign superintendence Sulphur is found in great abundance, especially in the north Petroleum and natural gas are found, but are still undeveloped Iron is also reported

Agriculture and Industries Agriculture is the chief industry and is carried on principally by the Chinese Camphor, tea, and sugar are the staples, but there are also produced rice, millet, corn, wheat, barley, yams, sweet potatoes, indigo, hemp, jute, peanuts, etc The forests which cover the mountainous parts are rich in bamboo, camphor, banyan, betel nut, and other trees The camphor tree, which was formerly looked upon as the most important asset of the island, as it gave to Japan a virtual control of the natural camphor supply of the world, is found principally in the eastern part of the island The relative importance of this industry has been greatly lessened by the production of synthetic camphor, which has become a rival in the world markets with that produced from the forest growths Since the monopolization of the camphor industry in 1899, steps have been taken for the elimination of the wasteful methods of production, which under the old régime had threatened the complete exhaustion of the camphor supply of the island In 1904, 4,685,000 pounds of camphor and 3,712,000 pounds of camphor oil were produced, and in 1912 the output had increased to 7,077,100 and 7,733,922 pounds respectively Tea is grown chiefly in the northern part and sugar in the southern part of the island The manufacturing industries are few and confined principally to the production of sugar, camphor, mineral oil, etc

Commerce and Transportation. Formosa has been open to foreign commerce since the Treaty of Tientsin (1858), which provided for the opening of the four ports of Tainan, Takow, Anping, and Tamsui There are 15 ports in the island, though most of the imports and exports occur at Tamsui and Kelung The two safest harbors are those of Kelung, in the north, and Takow, in the southwest The total value of merchandise exported from the island in 1911 was $26,500,000 to Japan and $6,700,000 to other countries, composed principally of tea, sugar, rice, camphor and camphor oil, hemp, jute, etc The imports of merchandise for the same year amounted to $17,300,000 from Japan and $9 897,000 from other countries, and consisted chiefly of fruit products, opium, textiles, metals and metal manufactures, lumber, saki, cigarettes and tobacco, etc After Japan, the countries sharing most in the trade of Formosa are China, British India, the United States, and Great Britain The imports direct from the United States in 1912 amounted to nearly $1,000,000, and the exports to the United States nearly $2,500,000 The trade is carried on principally by Chinese and a few European firms, while the commercial influence of Japan is confined to the trade in camphor, opium, and salt—all government monopolies Nearly all of the trade is carried in Japanese ships The principal bank of the island, the Bank of Formosa, is a private corporation under government supervision, and has the right of issuing notes, whose circulation, however, is confined to the island The coin in circulation is that of the Japanese government The construction of means of transportation and communication is being pushed by the Japanese government with great rapidity A trunk line, from Takow in the southwestern part of the island to Kelung in the north, has been completed The total length of railway is now 290 miles, besides 150 miles of light railway The telegraph system has about 700 miles of line and the telephone system 800 miles

Government and Finance. The island is under the administration of a military governor-general, who is responsible to the cabinet at Tokyo He is assisted by a council The civil Governor, who resides at Taipei, which is called by the Japanese Taihoku, is responsible for the civil administration Formosa and the Pescadores are divided, for administrative purposes, into seven districts, of which three are known as *kens*, or prefectures of first rank, and the other four as *chos*, or prefectures of the second class The judicial code of the island is different from that of Japan The finances are still in an unsatisfactory condition, owing to the unsettled state of the island, which necessitates the maintenance of a large military force The budget of the colony for 1913–14 estimated the revenue at $21,940,000, and the expenditure at a like sum The revenue is derived chiefly from monopolies, customs, and subsidies from Japan Japanese schools are being established all over the island In 1910 there were over 20,000 native pupils in Japanese schools

Population According to the official estimate of 1913 the population was 3,512,607, besides a temporary population of 20,000 In 1910 the population was 3,341,217 The Japanese number about 50,000 The chief towns are Dai Hoku (95,000), Taiwan City (60,000), Tamsui, and Kelung In the earthquake of March 17, 1906, 1228 persons were killed and 2329 were injured

Ethnology The population consists of three elements (1) the Japanese, who, apart from the garrisons, are mostly officials, teachers, traders, and fishermen, (2) the aboriginal tribes and clans, and (3) the Chinese settlers, chiefly from the provinces of Fukien and Kwangtung on the mainland These occupy the plain which borders the west coast, and the regions of the north The Hakkas (q v) form an important feature of this part of the population They live in villages of their own and carry on the greater portion of the barter trade with the aborigines Until comparatively recent times no official was allowed within their inclosures

So little is known regarding the aboriginal inhabitants of Formosa that the question of their relationship is very obscure When the early Chinese settlers arrived in Formosa, some

time after the year 1430, they approached it by the west coast, where they found many tribes of savages Those first encountered they designated Pepohwan, 'Barbarians of the level plain' These were gradually dispossessed and driven eastward to the low hills which flank the mountains on the west They have acquired a certain amount of civilization and speak Chinese The males for the most part dress like the Chinese and in religious matters follow the Chinese, though they still retain many of their original notions and practices Inheritance is through the mother By the Chinese they are now designated Sek-hwan, 'cooked,' or 'tamed, barbarians,' as distinguished from the Chi-hwan, 'raw,' or 'untamed, barbarians,' whose habitat is in the mountains beyond and in the south These are divided into many tribes and clans, with a great variety of languages and dialects, and preserve in their wild independence their ancient customs and institutions—bodily ornaments and mutilations, tattooing, head hunting, spirit and nature worship, etc They live in villages, have houses of stone roofed with great slabs of slate, and are remarkably neat and clean Those living on the hillsides build houses of bamboo, grass, and mud Order prevails everywhere, and in marriage matters they are very strict Often a large house is provided outside the village where the unmarried men sleep They cultivate millet and other crops

History Chinese records speak of an expedition against Formosa undertaken as early as the year 603 Japanese adventurers are said to have landed and made conquests in it in the twelfth century, and we are told that from the fifteenth century the eastern or aboriginal half was officially considered by the Japanese as a part of their empire The first Europeans to visit the island were Portuguese This was in 1590 The Spanish attempted to hold a part of the island, but were driven out by the Dutch, who had gained a footing in the Pescadores in 1621 In 1624 the Dutch occupied a point near Taiwan, where they built a fort and a town which they called Zeelandia, began commercial operations on a great scale, opened schools, and inaugurated mission work When in 1620 the persecution of native Christians broke out in Japan, large numbers of them fled to Formosa and formed a colony, but later dwelt with the Dutch until the latter were forced in 1662 to withdraw, as the result of many conflicts with the Chinese settlers and with Koxinga (q v), the famous pirate, who succeeded in making himself King of the island After a brief and stormy reign his successor was dethroned by the Manchu emperors The opening in 1858 of Formosa to foreigners was an important event in the history of the island Roman Catholic missions were established in 1859, Protestant missions in 1860, and by 1864 a prosperous foreign trade had been established The aborigines, however, continued to give trouble As the result of the murder of a number of Japanese sailors by the natives, China was appealed to for redress, but disclaimed responsibility for the acts of the savages In 1874 the Mikado sent a punitive expedition under General Saigo On the protest of the Peking government, however, the Japanese retired, but only on conditions secured in Peking by the Japanese envoy—Soyeshima (q v)—that China should reclaim and govern east Formosa and pay the expense incurred by Japan In 1884 Kelung was taken by the French under Admiral Courbet and held until June, 1885

One result of the Chino-Japanese war over Korea, in 1894–95, as specified in the Treaty of Shimonoseki (q v), was the cession of Formosa to the Mikado's officers, June 2, 1895 The Chinese officials on the island, summoning the Black Flag General Liu to their aid, declared a 'republic" Forthwith the Japanese Imperial guard of 7000 men was dispatched, the rebellious republic was duly crushed, and the natives were chastised Then began the costly occupation and development Outbreaks have been frequent, but order is being rapidly evolved from the complicated conditions of races and interests

Bibliography. This is extensive, but it may be simplified by consulting Henri Cordier's *Bibliographie des ouvrages relatifs à l'île Formose* (Paris, 1903) The works of the early annalists contain much that is both useful and curious See Imbault-Huart, *L'Ile Formose* (Paris, 1893) For those who can read French, this is an excellent work to refer to Other general works on Formosa are Campbell, *Missionary Success in Formosa* (London, 1889), Mackay, *From Far Formosa The Island, its People and Missions* (New York, 1896), *Geschichte Formosa bis Anfang 1898* (Bonn, 1898), Swinhoe, *Notes on the Island of Formosa* (1863) —Mr Swinhoe was a naturalist, Le Gendre, "Account of a Visit to the Southern Tribes," in *United States Commercial Relations for 1868–69*, House, *The Japanese Expedition to Formosa* (Tokyo, 1875) The astonishing literary imposture may also be consulted Balmanazar, *Description of Formosa* (London, 1705) Davidson, *The Island of Formosa* (1902), Y Takekoshi, *Japanese Rule in Formosa*, trans by G Braithwaite (London, 1907), and Terry, *The Japanese Empire, including Korea and Formosa* (Boston, 1914), are the most recent works on the subject

FORMO'SAN DEER A species of deer (*Cervus taevanus*) peculiar to the mountains of Formosa, and frequently caught in traps by the people and tamed as a pet It is one of the "sika" group, which includes the spotted deer of Japan and others of Manchuria It is lighter in color than the others, while the spots have a tendency to persist during winter, and the tail is white with a black stripe down the middle of its upper side See SIKA

FORMO'SUS. Pope, 891–896 He was born about 816, probably in Rome, and first appears in history as Cardinal Bishop of Porto (864), he was sent on an embassy to the Bulgarians by Nicholas I in 866 and trusted with important missions by Adrian II His period was one of strife between the factions which drove on the disruption of the Empire of Charlemagne Having sided with the German faction against John VIII, he was excommunicated and banished, but on taking an oath never to return to Rome or again to assume his episcopal functions, he was readmitted as a layman to the rites of the church (878) From this oath he was absolved by Marinus, the successor of John VIII, and restored to his dignities (883), and on the death of Stephen VI, in 891, he was chosen Pope The Italian faction had chosen Sergius; and the election of Formosus, which was in opposition to an old rule against the translation of bishops from one see to another, could not be confirmed without violence, but he was rendered secure for a time by the success of the arms of Arnulf of

Germany After the withdrawal of Arnulf Formosus was compelled to grant the Imperial crown to Lambert, son of Guido of Spoleto, but this act did not pacify the Italian faction, and Formosus was released from very hard straits only by the arrival of Arnulf, who captured Rome in the end of 895 In the following year Arnulf was crowned Emperor by Formosus, who died soon after His successor, Stephen VII, had his body disinterred and treated with contumely as that of a usurper of the papal throne, but Theodorus II, in 897, restored it to Christian burial, and at a synod presided over by John IX, in 898, the pontificate of Formosus was declared valid and all his acts confirmed Consult A E McKilliam, *Chronicle of the Popes from St Peter to Pius X* (London, 1912)

FORMS, or QUANTICS In mathematics, rational, algebraic, integral, homogeneous functions of r variables, $x_1, x_2, x_3, \ldots x$, the degree of these variables being the order of the form If $r = 2$ there results a binary form, if $r = 3$, a ternary, etc, terms due to Gauss (1801) Symbolically a binary form may conveniently be represented by $f(x_1, x_2) = \sum_{r=0}^{n} \binom{n}{r} a_r x_1^{n-r} x_2^r$ With algebraic forms is connected the study of invariants and covariants, the whole subject being sometimes called, by the English, the theory of quantics, or modern higher algebra The theory was first extensively investigated by Gauss (q v), although Lagrange had already studied the invariant property of the discriminant (Sylvester, 1852, Gauss had called it the determinant, 1801) $a_0a_2 = a_1^2$, of the quadratic form $a_0x^2 + 2a_1xy + a_2y^2$, finding, viz, that it is unaltered by substituting $x + \lambda y$ for x To Boole (1841) is due the discovery of the invariant property of the discriminant of every binary form Eisenstein, Hesse, Aronhold, and Clebsch in Germany, Cayley and Sylvester in England, and Brioschi in Italy, have been among the most prolific contributors to the theory The best historic survey is that of Franz Meyer, "Bericht uber den gegenwartigen Stand der Invariantentheorie," in *Jahresbericht der deutschen Mathematiker-Vereinigung*, vol i (Berlin, 1892) The most important treatises upon the subject are Cayley's "Memoirs upon Quantics," in the *Philosophical Transactions* (London, 1854 et seq); Salmon, *Modern Higher Algebra* (Dublin, 1859, and enlarged later editions), Fiedler, *Die Elemente der neueren Geometrie unter der Algebra der binaren Formen* (Leipzig, 1862), Clebsch, *Binare Formen* (ib, 1872), Faà di Bruno, *Formes binaires* (Turin, 1876, Leipzig, 1881), Gordan, *Invariantentheorie* (ib, 1887), Elliot, *Algebra of Quantics* (2d ed, Oxford, 1913) An important digest of the theory, with bibliography and historical notes, is Meyer, "Invariantentheorie," in the *Encyklopadie der mathematischen Wissenschaften*, vol i (Leipzig, 1899).

FORMS OF ACTION. The approved classes into which actions are divided under the common-law system of pleading and practice They had their origin in the use of original writs, which were mandatory letters or processes issuing in the King's name, containing a statement of the alleged injury, and directing the sheriff to first command the defendant to satisfy the claim, and, on his failure to do so, to summon him into court to answer and defend the complaint made against him Many of these writs were of remote antiquity, some of them antedating the Conquest, and others being shaped by the clerks and judicial officers of the Norman kings They were drafted in fixed and certain forms, providing remedies for the more ordinary and obvious civil wrongs These writs were limited in number, and where an injured person could not make the facts of his case fit the allegations of a known writ, he was wholly without remedy, as there was no other way in which he could get his cause before the court Thus they had the effect of limiting and defining the right of action itself, and for this reason the enumeration of writs and causes of action became identical This condition of affairs was somewhat relieved by the introduction of curious and arbitrary legal fictions, whereby an old writ was made to do service for a new cause of action Thus, there being no form of action for the recovery of goods unlawfully detained by a tortfeasor, the action in trover, originally devised to permit the recovery of lost goods from the finder, was without change of form made available for the more general purpose For example, if A, having B's goods in his possession, wrongfully withheld them from B, the writ would allege that B had casually lost the goods and A had found them, but, although knowing them to be the goods of B, had refused to deliver them to him B was not required to prove this fictitious allegation, but could show the true circumstances, which might be that he had given A the goods to store for him, to be returned on demand, and that A had converted them to his own use

A further important modification of the ancient forms of action was effected by a statute enacted in the reign of Edward I, which provided that where the facts of a new case were similar to those covered by a known writ, the clerks of Chancery should have power to frame a new writ to meet the exigencies of the case This caused an increase in the number of writs, and consequently in forms of action, the new forms being known as actions on the case, i e, actions in similar cases (*in consimili casu*), and contributed very greatly to making the common-law system more efficient in the administration of justice Notwithstanding these changes, forms of action have always tended to become inflexible and insufficient for the relief of many civil wrongs, and this inflexibility has been a potent cause of the growth of equity jurisdiction

The following were the principal forms of action at common law Assumpsit, Covenant, Debt, Account, Trespass, Trover, Case, Detinue, Replevin, Ejectment, and Writ of Entry They have been abolished in England by the Judicature Acts (q v), and in several of the United States have been superseded by modern forms of action instituted by codes of procedure, but they are still in use with some changes and modifications in some jurisdictions See ACTION, COMMON COUNTS, COMMON FORMS, PLEADING, PRACTICE

FORMS OF ADDRESS In those countries where gradations of rank and title prevail there is great complexity in the forms of address. As those which are most often practically useful, the ceremonious modes of addressing letters to titled personages in England are given in the accompanying table It must be understood that in nearly all cases these forms are employed only where strict formality is requisite, as from com-

plete or comparative strangers In informal conversation it is nowhere the custom of persons of good social position to use the strict forms here given unless there are personal or professional reasons for it Thus, e g, a very young man of good manners, speaking to an aged and distinguished peer, or a clergyman to his bishop, may call him "My Lord", but the King or the Prince of Wales is usually addressed by persons with whom he is acquainted simply as "Sir," the Queen as "Ma'am," a duke as "Duke," other peers and their wives as "Lord ——" and "Lady ——"

Forms of address in the United States are not so rigidly governed by custom as in the older or monarchical countries, but common usage has sanctioned the following forms

The President of the United States is addressed simply as "The President of the United States"

Governors of States and ambassadors and ministers to foreign countries are addressed as "His Excellency" (the Ambassador from Great Britain)

The Vice President, heads of executive departments at Washington, justices of Supreme or Superior courts, lieutenant governors of States, mayors of cities, etc, "The Hon —— ——" (Vice President of the United States, etc)

Senators and Representatives of the United States, or of the several States, "The Hon —— ——," to which may be added their official designation

Ex-presidents or other former officials of the above-mentioned ranks are commonly addressed as "The Hon —— ——."

Archbishops "The Most Rev the Archbishop of ——" (If a cardinal, "His Eminence the Cardinal Archbishop of ——")

Bishops in the Roman Catholic or Episcopal churches "The Right Rev the Bishop of ——," or "The Right Rev —— ——" The Presiding Bishop in the Episcopal church, "The Most Rev," etc , dean of cathedrals, "The Very Rev," etc , and archdeacons of dioceses as "Venerable," usually shortened to "Ven" In the Methodist church, "The Rev Bishop ——"

The use of the term "Esquire" was at one time largely confined in America to addressing lawyers, but more recently the English practice which attributes it to any gentleman of position not possessing another title has been gaining ground, although "Mr —— ——" is still a common usage

PERSONAGE	Address of letter to	Beginning of letter to and reference to
Archbishop	His Grace the Lord Archbishop of ——	My Lord Archbishop, your Grace.
Baron	The Right Hon Lord ——	My Lord, your Lordship
Baron's son	The Hon John ——	Sir
Baron's daughter	The Hon Mary —— (If married, the Hon Mrs ——)	Madam
Baronet	Sir John ——, Bart	Sir
Baronet's wife	Lady ——	Madam
Bishop	The Right Rev the Lord Bishop of ——, or simply, The Lord Bishop of ——	My Lord, your Lordship
Countess	The Right Hon the Countess of ——	Madam, your Ladyship
Daughter of Duke, Marquis, Earl	The Lady Mary ——	Madam, your Ladyship
Duchess	Her Grace the Duchess of ——	Madam, your Grace
Duke	His Grace the Duke of ——	My Lord Duke, your Grace
Earl	The Right Hon the Earl of ——	My Lord, your Lordship
Eldest son of Duke, Marquis, Earl	Uses the second title of his family, and is by courtesy addressed as though he held the title by law	
King	His [Most Gracious] Majesty the King	Sire, your Majesty.
Knight	Sir John —— (If a knight commander of any order, its initials follow name, as K C B , K C S I)	Sir
Knight's wife	Like baronet's wife	
Lord Lieutenant (of Ireland)	His Excellency the Lord Lieutenant	According to rank
Lord Mayor*	The Right Hon the Lord Mayor	My Lord, your Lordship
Maid of Honor	The Hon Mary S ——	Madam
Marchioness	The Most Hon the Marchioness of ——	Madam, your Ladyship
Marquis	The Most Hon the Marquis of ——	My Lord, your Lordship
Members of Parliament	The letters M P are added to their usual address	
Officers in the Army and Navy	Their rank in the service, if above subaltern, is prefixed to any other rank	
Prince	His Royal Highness the Prince of ——, or Prince ——, or (if the prince is a duke) His Royal Highness the Duke of ——	Sir, your Royal Highness
Princess	Her Royal Highness the Princess of ——, or the Princess ——, or the Duchess of ——	Madam, your Royal Highness.
Privy Councilor	The Right Hon —— ——	
Queen	Her Majesty the Queen	Madam, your Majesty
Viscount	The Right Hon Viscount ——	My Lord, your Lordship
Viscountess	The Right Hon Viscountess ——	Madam, your Ladyship
Younger sons of Duke or Marquis	The Lord John ——	My Lord, your Lordship
Younger sons of Earl or Viscount	The Hon ——	Sir

*The title "Lord Mayor" is confined to the chief magistrate of the city of London and a few of the larger cities—until recently York and Dublin alone

FOR'MULA, CHEMICAL See CHEMISTRY

FORMULA OF CONCORD. See CONCORD, BOOK OF

FORNARINA, fôr'na-rē'na, LA See RAPHAEL, SEBASTIANO DEL PIOMBO

FOR'NEY, JOHN WEISS (1817–81). An American journalist and politician He was born at Lancaster, Pa , and at the age of 16 entered the printing office of the Lancaster *Journal* Four years later he purchased the Lancaster *Intelligencer*, and in 1840 he became proprietor of the *Journal* and combined the two papers under the name of the *Intelligencer and Journal* In 1845 President Polk appointed him deputy surveyor of the port of Philadelphia, where he purchased a half interest in the *Pennsylvanian*, a Democratic paper of great influence, which under his editorial control attained a

national importance In 1851–55 he was clerk of the United States House of Representatives, and he edited the *Union*, the organ of the Northern Democrats He conducted Buchanan's successful campaign for the presidency, and Buchanan would have given him a cabinet office if the appointment had been more popular in the South Buchanan's influence was not strong enough to win Forney a seat in the United States Senate, which went instead to Simon Cameron (q v) In August, 1857, Forney established the Philadelphia *Press* At first a Douglas Democrat, he became, in the latter days of the Buchanan administration, a Republican and contributed to the organization of that party and its early successes In 1859–61 he was a second time clerk of the House, and he published in Washington the *Sunday Morning Chronicle*, which in 1862 was changed to a daily, and was throughout the Civil War looked upon as the organ of the Lincoln administration After serving as secretary of the United States Senate from 1861 to 1868, he disposed of his interest in the *Chronicle* and returned to Philadelphia, where in 1871 he was made collector of the port by President Grant He was an earnest promoter of the Centennial Exposition and visited Europe in its interest in 1875 In 1877 he sold the *Press* and established a weekly, the *Progress*, which he edited until his death In 1880 he left the Republican party and supported Hancock for the presidency He published *Letters from Europe* (1869), *What I Saw in Texas* (1872), *Anecdotes of Public Men* (2 vols, 1873), *Forty Years of American Journalism* (1877), *The New Nobility* (1881) Consult McClure, *Old Time Notes of Pennsylvania* (Philadelphia, 1905)

FORNICA'TION (*fornicatio*, from *fornix*, an arch vault, and by metonymy a brothel, because brothels in Rome were in cellars and vaults under ground) The illicit carnal intercourse by an unmarried person with one of the opposite sex, whether married or unmarried In most countries this offense has been brought within the pale of positive law at some period of their history, and prohibited by the imposition of penalties more or less severe, but it is now usually left to the restraints which public opinion imposes on it in every community which is guided by the principles of morality and religion In England, in 1650, during the ascendancy of the Puritan party, the repeated act of keeping a brothel or committing fornication was made felony without benefit of clergy on a second conviction At the Restoration this enactment was not renewed, and though notorious and open lewdness, when carried to the extent of exciting public scandal, continued, as it had been before, an indictable offense at common law, the mere act of fornication itself was abandoned "to the feeble coercion of the spiritual court" In a few of the United States the offense is made a misdemeanor by statute, punishable by fine and imprisonment, but in most of the States it is ignored as at common law Consult the authorities referred to under CRIMINAL LAW

FORO APPIO See FORUM APPII

FORRER, fō'rā', LUDWIG (1845–1921). A Swiss statesman, born in Islikon, near Winterthur, and educated at the University of Zurich He was in the department of police and then was cantonal attorney of Zurich, and in 1873 began to practice law in Winterthur He went into politics, became president of the Nationalrat in 1891, director of the central office for railways in 1900, and a member of the Bundesrat in 1902 and leader in it of the Radical party In 1906 and 1912 he was President of the Swiss Confederation

FOR'REST, DAVID WILLIAM (?—) A Scottish clergyman, born in Glasgow He was educated at Glasgow and Leipzig universities and the United Presbyterian College, Edinburgh, was pastor of Saffronhall Church, Hamilton (1882–87), the United Presbyterian Church of Moffat (1887–94), the Wellington Church, Glasgow (1894–99), and the United Free Church, Skelmorlie, Wemyss Bay (1899–1903), and in 1903 became minister of the Edinburgh North Morningside United Free Church He was Kerr lecturer at Edinburgh in 1897, publishing his lectures under the title *The Christ of History and of Experience* (1897, 6th ed, 1908), and was special lecturer at Yale University in 1901 He wrote *The Authority of Christ* (1906) and was joint editor of *The Letters of Dr John Brown* (1907)

FOR'REST, EDWIN (1806–72). An American tragedian, long the most famous that our stage had produced He was born in Philadelphia, March 9, 1806, of Scottish and German descent Already he had attracted attention in amateur theatricals when, Nov 27, 1820, he made his first regular appearance at the Walnut Street Theatre, in Philadelphia, in Home's *Douglas* By diligence and close study he rose in the profession and in 1826, at the Park Theatre, New York, made a decided triumph in *Othello* Henceforward his career was one of distinction, both in this country and in England, where he made his first appearance at Drury Lane in *The Gladiator* in 1836 There in 1837 he married Catharine, the daughter of John Sinclair, the singer In later years he became jealous of her, and the trial by which, in 1852, she obtained a divorce was one of the most celebrated cases of the time His quarrel with Macready, whom he hissed from a private box in Edinburgh, was another affair which did him little honor Much of the odium that has been cast upon him for the Astor Place Riot in New York (1849), which was ostensibly in favor of Forrest against his English rival, was certainly undeserved, for that unfortunate outbreak was really one of the episodes of the native American movement of this period, but Forrest's relation to the matter was far from dignified Though he lost the favor of many of the best people, his success upon the stage was, nevertheless, uninterrupted He had already made a fortune and built a castle on the Hudson, called Fonthill, later he established himself in a home in Philadelphia His last professional appearance was in 1871 He died Dec 12, 1872, from apoplexy, after an illness of half an hour In his will he left a large portion of his ample estate to found a home for aged and destitute players

Forrest has been called essentially a melodramatic actor His robust physique and voice made the assumption of sentimental parts almost impossible In Shakespeare his best rôles were Richard III, Lear, Coriolanus, and Othello, but he was even more effective in Virginius, Metamora, Spartacus, Damon, and characters of that range His personal disposition was impetuous and frank, though marred at times by jealousy and an excessive opinion of his own merits He was an arduous student of his pro-

fession and gathered a splendid library, in which the Shakespearean collection was famous Consult Barrett, *Edwin Forrest* (Boston, 1882), Alger, *Life of Edwin Forrest, the American Tragedian* (Philadelphia, 1877), Rees, *The Life of Edwin Forrest, with Reminiscences and Personal Recollections* (ib, 1874), Winter, *Other Days* (New York, 1908), id, *The Wallet of Time* (2 vols, ib, 1913)

FORREST, French (1796–1866). An American naval officer, born in Maryland He distinguished himself as a midshipman in the War of 1812 and was present at the battle of Lake Erie In 1817 he became a lieutenant, in 1837 commander, and in 1844 captain During the Mexican War he was adjutant general He joined the Confederates at the outbreak of the Civil War, was appointed to the command of the navy yard at Norfolk, and became Acting Assistant Secretary of the Confederate navy

FORREST, Sir George William (1846–1926) A British administrator and historian of India He was born in Nasirabad, the son of an English captain, and was educated at St John's College, Cambridge In 1872 he was appointed to the Bombay Educational Department, in 1882 was census commissioner in Bombay, became professor of English history at Elphinstone College in 1887 and director of records for Bombay in 1888, and was knighted in 1913 He edited valuable *Selections* from the Bombay State Papers, especially on the Indian Mutiny (1897), and wrote *The Administration of Warren Hastings* (1892), *The Administration of the Marquis of Lansdowne* (1894), *History of the Indian Mutiny* (1904–12), *Life of Field-Marshal Sir Neville Chamberlain* (1909)

FORREST, Sir John (1847–1918) An Australian explorer and politician, born near Bunbury, in Western Australia He entered the survey department of that colony in 1865, in 1869 commanded an expedition to the interior to trace Dr Leichhardt, and in 1870 led an exploring expedition from Perth to Adelaide In 1874 he commanded a second exploring expedition, from Champion Bay on the west coast to the overland telegraph line between Port Darwin and Adelaide, a distance of about 2000 miles He was appointed Deputy Surveyor-General of Western Australia in 1876, and Commissioner for Crown Lands and Surveyor-General in 1883 From 1890 to 1901 he served as first Premier and Treasurer of Western Australia In 1901 he became Postmaster-General in the first cabinet of the Australian Commonwealth, but in the same year was transferred to the Ministry of Defense, which he held till 1903, was Home Minister till 1904, and Postmaster-General again in that year He was Treasurer in the Deakin cabinet in 1905–07 He was knighted in 1891 His publications include *Explorations in Australia* (1876), and *Notes on Western Australia* (1884–87)

FORREST, Nathan Bedford (1821–77) An American cavalry leader on the Confederate side during the Civil War He was born near Chapel Hill, Tenn, on July 13, 1821, removed with his father, a blacksmith, to Tippah Co, Miss, in 1834, attended school for only about six months altogether, joined an uncle in the horse and cattle trading business at Hernando, Miss, in 1842, later became a slave trader at Memphis, Tenn, and by 1859, when he became a cotton planter in Mississippi, had accumulated a fortune Though at first opposed to a dissolution of the Union, he entered the Confederate army as a private in June, 1861, and in July was called upon by Governor Harris of Tennessee to organize a battalion of cavalry, of which, in October, he became lieutenant colonel Soon afterward he was ordered to Fort Donelson, where he remained until Grant's attack, and with Floyd and the cavalry escaped on the night of Feb 15–16, 1862, leaving Buckner to surrender on the 17th (See Fort Henry and Fort Donelson) On July 21, 1862, he was promoted to be brigadier general and thereafter served in Kentucky for some time under General Bragg He was transferred to northern Mississippi in November, 1863, was promoted to be major general on December 4 of that year, and in November of the following year was placed in command of all the cavalry with the Army of Tennessee On Jan 24, 1865, he was placed in command of the cavalry in Alabama, Mississippi, and east Louisiana, on February 28 became a lieutenant general, in March was defeated at Selma, Ala, by Gen J H Wilson, and in May surrendered at Gainesville, his troops being included in the arrangement made by Gen Richard Taylor with General Canby In the North he became unfavorably known as the leader of the Confederates at the so-called "massacre of Fort Pillow," though he uniformly denied the charges that were brought against him (See Fort Pillow) After the war he worked his plantation for a time, was president from 1868 to 1874 of a company which endeavored without success to build a railroad between Memphis and Selma, and subsequently until his death conducted two large plantations, one on President's Island and the other in Shelby Co, Tenn During part of the Reconstruction period he is said to have been at the head of the Ku-Klux Klan (q v) Forrest was 6 feet, 2 inches tall and weighed 185 pounds A born soldier, he suffered not a little from his lack of education A fine equestrian monument to him by Niehaus was unveiled in Forrest Park, Memphis, Tenn, in 1905 Consult Jordan and Pryor, *Campaigns of Nathan B Forrest* (New York, 1868), Wyeth, *Life of General Nathan Bedford Forrest* (ib, 1899), Mathes, *General Forrest* (ib, 1902), one of the "Great Commanders Series"

FORREST CITY A city and the county seat of St Francis Co, Ark, 90 miles (direct) east by north of Little Rock, on the St Louis, Iron Mountain, and Southern and the Chicago, Rock Island, and Pacific railroads (Map Arkansas, E 2) The city contains the Crowley Ridge Institute and a courthouse It is the centre of a fertile agricultural and stock-raising district, and manufactures spokes, cottonseed oil, lumber, cotton, veneer, ice, bottling-work products, etc The water works, sewage system, and electric-light plant are owned and operated by the city Pop, 1900, 1361, 1910, 2484

FORRESTER, Alfred Henry (1804–72). An English artist, whose pen name was Alfred Crowquill He was born in London At the age of 20 he began to contribute to various periodicals and afterward practiced drawing and modeling, wood and steel engraving He contributed sketches to *Punch*, the *Illustrated London News*, other periodicals, and several annuals, and illustrated many books, six of which he wrote himself *Phantasmagoria of Fun* (1843) is representative of his best work, and some of his other publications are *A Bundle of Crowquills* (1854); *The Comic Arithmetic*

(1844), *The Book of Ballads* (1849, with Doyle and Leech) His elder brother, CHARLES ROBERT (1803–50), also employed the name of Alfred Crowquill Charles was for a time on the staff of the *New Monthly Magazine* and *Bentley's Miscellany* He was the author of several novels and tales

FORRESTER, CHARLES ROBERT See FORRESTER, ALFRED HENRY

FORRESTER, FANNY The pseudonym of Miss Emily Chubbuck, who became the wife of Adoniram Judson, the American missionary See JUDSON, ADONIRAM

FORSBERG, fôrs'bĕr-y', NILS (1842–). A Swedish historical and portrait painter He was born at Riseberga, Skåne, the son of a peasant, and was apprenticed to a house painter at Goteborg A statue of Minerva which he modeled having procured for him a government stipend, in 1867 he went to Paris, where he studied painting under Bonnat The siege of Paris, during which he enlisted in the Ambulance Department, afforded him opportunities for studying and sketching the stirring scenes that came under his observation. In 1877 he exhibited "An Acrobat Family," now in the Museum at Goteborg, which contains nude figures of great energy and virility "The Hero's Death" (1888), for which he was awarded the great gold medal at the Paris Salon, now in the National Museum at Stockholm, is an attempt to reconcile the traditional historical picture with modern painting Afterward he devoted himself more especially to historical subjects, and still later to portraits He received a gold medal at the Paris Exhibition of 1900 and was made Chevalier of the Legion of Honor in 1901

FORSETE, fôr-sĕt'e, or **FORSETI,** fôr-sĕt'ē (Icel, Fore-seated) The son of Balder, and the god of Justice, in Norse mythology

FORSH'EY, CALEB GOLDSMITH (1812–81) An American engineer, born in Somerset Co, Pa He was educated at Kenyon College, Ohio, and at West Point, but left the latter institution in 1836 before graduating and became professor of mathematics and civil engineering at Jefferson College, Miss He was engaged in engineering work in the Southwestern States for several years, was engineer in charge of the government survey of the Mississippi River delta from 1851 to 1853, and from 1853 to 1855 was chief engineer of the Galveston, Houston, and Henderson Railroad In 1855 he established the Texas Military Institute and served as its principal until 1861, when, on the outbreak of the Civil War, he joined Sam Houston in actively opposing the Secession movement in Texas After the secession of the State, however, he offered his services to the Confederacy and was commissioned a lieutenant colonel of engineers, in which capacity he performed valuable services both in Virginia, where he served on the staff of General Magruder, and in Texas After the war he engaged in railway engineering and in work on the Mississippi River and its branches He was one of the authors of *The Physics of the Mississippi River* (1861, new ed, 1876)

FORSKÅL, fôr'skal, PETER (1736–63) A Swedish botanist He was born in Kalmar, studied at Gottingen, and was professor at Copenhagen In 1761 he took part in a scientific expedition to Egypt and Yemen, where he collected several hundred plants which had previously been unknown Seized with an attack of the plague, he died on his journey in Arabia Among his publications are *Dubia de Principiis Philosophiæ Recentioris* (1756), *Descriptiones Animalium, Avium, Amphibiorum, Piscium, Insectorum, Vermium quæ in Itinere Orientali Observavit Petrus Forskal* (1775), *Flora Ægyptiaco-Arabica* (1775) The genus *Forskalia* is named in his honor

FORSSELL, fôrs-sĕl', HANS LUDVIG (1843–1901) A Swedish historian, editor, and statesman, born at Gefle He was educated at the University of Upsala, where he became an instructor in 1866 In 1875–80 he was Finance Minister and from 1888 President of the Exchequer From 1879 to 1897 he was a member of the Upper House of the Riksdag He largely assisted in the establishment of the gold standard for Swedish currency, and wrote *Studier och Kritiker* (1875–88), collections of essays, *Sveriges inre historia från Gustaf I* (1869–75), *Anteckningar ur Sveriges jordbruksnaring i 16 seklet* (1884)

FORST, fôrst A town in Brandenburg, Prussia, on the Neisse, 44 miles south of Frankfort-on-the-Oder (Map Prussia, F 3) Its chief industry is weaving cloth, in which 112 factories engage more than 11,000 hands It also has tanneries, and manufactories of buckskin, leather goods, artificial flowers, and dyestuffs Forst was founded in the thirteenth century It has belonged to Prussia since 1815 Pop, 1900, 32,075, 1910, 33,875

FORSTEMANN, fôr'ste-man, ERNST WILHELM (1822–1907) A German philologist, born in Danzig In 1865 he became chief librarian at the Royal Library in Dresden His services in behalf of the reorganization of the Dresden Library were most important His principal publications include *Altdeutsches Namenbuch* (2 vols, 2d ed, vol i, 1900, 2d ed, vol ii, 1872), a valuable and interesting work devoted to a discussion of old German proper names, the volumes being respectively devoted to names of persons and places, *Geschichte des deutschen Sprachstamms* (1874–75), *Aus dem alten Danzig, 1820–40* (1900), and commentaries on the Maya manuscripts in the libraries of Dresden (1901), Madrid (1902), and Paris (1903)

FORSTER, fôr'stĕr, AUGUST (1822–65) A German anatomist, born at Weimar and educated at Jena He held professorships at Gottingen (1852–56) and Wurzburg (1856–65), where his investigations on pathological histology and teratology gave him a wide reputation His chief publications include *Lehrbuch der pathologischen Anatomie* (10th ed, 1875), *Atlas der mikroskopischen pathologischen Anatomie* (1854–59), *Grundriss der Encyklopadie und Methodologie der Medizin* (1857)

FÖRSTER, ERNST (1800–85) A German art critic and painter, brother of Friedrich Christoph, the historian and poet He was born at Munchengosserstadt, Saxe-Meiningen, April 8, 1800, and at first studied theology and philosophy, but, soon devoting himself to art, entered the studio of Peter Cornelius at Munich He was employed in painting the frescoes in the Aula at Bonn, and those of the Glyptothek and the arcades at Munich, but his reputation rests chiefly on his researches and writings on the history of art His greatest discovery was the frescoes by Jacopo di Avanzo (1376), in the chapel of San Giorgio at Padua Among his paintings are "Hellas Liberated" and portraits

of the Duke and Duchess of Altenburg and children Among his frescoes are scenes from Goethe's poems, and scenes from Wieland's *Musarion* and *Die Grazien*, Royal Palace, Munich Among his works are *Die Wandgemalde der Sanct Georgenkapelle zu Padua* (1841), *Vorschule der Kunstgeschichte* (1862), *Denkmale deutscher Baukunst, Bildnerei und Malerei* (1855–69), *Geschichte der deutschen Kunst* (1851–60), *Geschichte der italienischen Kunst* (1869–78), *Peter von Cornelius* (1874) Most of these works were illustrated by woodcuts after his own designs He wrote a life of Jean Paul Richter, who was his father-in-law, and edited several of his works He died at Munich, April 29, 1885

FORSTER, fôr'stâr', FRANÇOIS (1790–1872) A French engraver, born at Locle, Switzerland He studied in Paris under the engraver Langlois, and then entered the Ecole des Beaux-Arts, where he won the Grand Prix de Rome in 1814 He was one of the foremost engravers on steel of his time, and handled the graver with remarkable skill, elegance, and firmness He is, however, often too coldly correct and fails to render the spirit of the original Among his most important plates are "Francis I and Charles V Visiting the Church of St Denis" (1826, after Gros), "Æneas and Dido," after Guérin (1828); "The Virgin of the Bas Relief," after da Vinci (1835), "The Madonna of the House of Orleans" (1838, after Raphael), "Christ on the Cross," after Sebastiano del Piombo (1851), and the portraits of Raphael, Durer, Humboldt, Wellington (after Gérard), and others He was appointed a member of the Institute in 1844

FORSTER, fôr'stêr, FRANZ (1819–78) A German jurist He was born and educated at Breslau, in 1868 became a member of the Prussian Ministry of Justice, and in 1874 was appointed director in the Ministry of Ecclesiastical Affairs He assisted in the compilation of the new Prussian Code of Judicial Procedure and wrote several standard works on Prussian law, notably, *Theorie und Praxis des heutigen gemeinen preussischen Privatrechts* (7th ed, 1896–97)

FÓRSTER, FRIEDRICH CHRISTOPH (1791–1868) A German historian and poet, brother of Ernst, the painter He was born near Kamburg, Saxe-Meiningen, and studied theology at Jena, then chiefly archæology and the history of art On the uprising of Prussia against France in 1813 he joined the Lutzow sharpshooters with Theodor Korner and, like him, wrote spirited war songs, many of which appeared in his *Gedichte* (1838) At the close of the war he became professor in the school of engineering and artillery in Berlin, but on account of democratic writings was dismissed in 1817 He then worked on various literary journals, among them the *Neue Berliner Monatsschrift* and the *Vossische Zeitung*, and in 1829 was made curator in the Royal Museum of Berlin His writings include *Albrecht von Wallenstein* (1834); *Gustav Adolf* (1833), an historical drama, *Preussens Helden in Krieg und Frieden* (1846), a severely criticized history of Prussia from 1640 to 1815, and an unfinished autobiography published posthumously in 1873, under the title *Kunst und Leben*

FORSTER, fôr'stêr, HEINRICH (1800–81). A German Roman Catholic prelate He was born at Grossglogau, was educated at Breslau, took priest's orders in 1825, and in 1837 was appointed chief preacher at the cathedral of Breslau In 1853 he was elected Bishop of Breslau At numerous synods and councils he proved himself a stanch defender of the orthodox Roman Catholic creed, although he opposed the dogma of infallibility at the Council of the Vatican In 1875, after repeated conflicts with the Prussian May laws (q v), in which he excommunicated priests who submitted to the state, and after violent demonstrations at the time of his jubilee as a priest, he was deposed from his see He was a famous pulpit orator His principal works are *Der Ruf der Kirche in die Gegenwart* (4th ed, 1879), *Die christliche Familie* (6th ed, 1893), *Kardinal Diepenbrock* (3d ed, 1878), *Gesammelte Kanzelvortrage* (5th ed, 1879) Consult A Franz, *Forster, Furstbischof von Breslau* (Breslau, 1875)

FOR'STER, JOHAN GEORG ADAM (1754–94). A German traveler and naturalist, born at Nassenhuben, near Danzig When 17 years old, he accompanied his father, Johann Reinhold Forster, in Captain Cook's third voyage around the world (1772) and on his return collaborated with him in an account of it, written in English, and entitled *Observations upon a Voyage around the World* (2 vols, 1777) After some time spent in Paris, where he made the acquaintance of Franklin and Buffon, he accepted a professorship of natural history at Cassel in 1778 and in 1784 was appointed to a similar position at Vilna He now obtained the degree of M D In 1787 he was called to Russia by Catharine II to undertake a voyage of discovery, which was abandoned on the outbreak of the Turkish War In the following year he accepted the office of librarian to the Elector of Mainz After the taking of Mainz by the French in 1792, Forster, who had become an enthusiastic Republican, went to Paris as the representative of the city, to secure its incorporation in the Republic. In the recapture of Mainz by the Prussians in the next year he lost his library and collections and determined to remain in Paris, where he died in 1794, while preparing to make an extensive trip to East India Besides numerous briefer works on scientific subjects, he wrote *Kleine Schriften ein Beitrag zur Lander- und Volkerkunde, Naturgeschichte und Philosophie des Lebens* (1879–97) and *Ansichten vom Niederrhein, von Brabant, Flanders, Holland, England und Frankreich* (1790–91) His letters were published by his wife, Therese, afterward Therese Huber (2 vols, 1829), and his complete works edited by his daughter, with a characterization of the author by Gervinus (1843). Consult Konig (2d ed, Leipzig, 1858); Moleschott (Hamm, 1862), Leitzmann (Halle, 1893)

FOR'STER, JOHANN REINHOLD (1729–98) A German traveler and naturalist, born in Dirschau, and educated for the clerical profession at Halle In 1753 he became pastor at Nassenhuben, near Danzig, but devoted most of his time to mathematics and the natural sciences In 1765 he accepted an offer made to him by the Russian government to inspect and report upon the new colonies founded on the banks of the Volga His irritable temper soon involved him in difficulties with the Russian government, and in the following year he went to England and became teacher of natural history at Warring-

ton, Lancashire In 1772 he was invited to take part in Cook's second expedition to the South Seas In 1777 he published, in collaboration with his son, his *Observations upon a Voyage around the World*, containing the information he had gathered in course of that voyage In the same year he returned to Germany and in 1780 became professor of natural history and mineralogy at Halle Besides the above work, he published *Zoologia Indica* (1781) and *Geschichte der Schiffahrt und Entdeckungen im Norden* (1784)

FOR'STER, JOHN (1812–76) An English biographer and political and historical writer, born at Newcastle He was educated for the bar, but early devoted himself to periodical writing His political articles in the London *Examiner*, for which he began writing in 1832, attracted unusual attention, owing to their vigor and outspoken honesty In 1846 he succeeded Dickens as editor of the *Daily News*, but resigned the next year to assume the editorship of the *Examiner*, a post which he held for nine years Among his works are *Lives of the Statesmen of the Commonwealth* (1836–39), *The Debates on the Grand Remonstrance* (1860), *Arrest of the Five Members* (1860), *Sir John Eliot A Biography* (1864), *The Life and Adventures of Oliver Goldsmith* (1848, enlarged, with a slight change in the title—*Life and Times of Oliver Goldsmith*—1854, an excellent piece of work), *Walter Savage Landor* (1869), *The Life of Charles Dickens* (1872–74), indispensable to the student of Dickens, and the first volume of a *Life of Swift* (1876) Forster was appointed secretary to the Commissioners in Lunacy in 1855, and Commissioner in Lunacy in 1861. In 1911 appeared the "Memorial Edition" of *The Life of Dickens* (2 vols, New York), with 500 illustrations, facsimiles, etc Consult R Renton, *John Forster and his Friendships* (New York, 1913)

FORSTER, JOHN COOPER (1823–86) A British surgeon He was born at Lambeth, London, and attended King's College School In 1841 he entered Guy's Hospital, where he was demonstrator in anatomy (1850–55), assistant surgeon (1855–70), and surgeon (1870–80), and he became a member of the College of Surgeons in 1844, a fellow in 1849, and was president of that body in 1884–85 He was peculiarly successful in operations required by intestinal diseases His publications include various papers in the *Transactions* of the Pathological and Clinical Society, and *The Surgical Diseases of Children* (1860).

FORSTER, fēr'stĕr, KARL (1784–1841) A German poet He was born at Naumburg, the son of a clergyman in that city After studying theology and philosophy at Leipzig he was appointed professor of the German language and literature at the Military Academy in Dresden in 1807 He completed Wilhelm Muller's *Bibliothek der deutschen Dichter des 17ten Jahrhunderts* and wrote many poems, several of which have been set to music. They were collected and published in 1843 His translations from the classic poets of Italy are also justly celebrated

FORSTER, LUDWIG VON (1797–1863). A German architect, born at Bayreuth He is chiefly remarkable for the impetus he gave to German and Austrian architecture by the foundation in 1836 of the *Allgemeine Bauzeitung*, a review devoted to that subject Among the buildings erected by him in Vienna are the synagogue in the Leopoldstadt (1838) and the Protestant Church of Gumpendorf (1849) He was also architect for the Elizabeth Bridge All his work is in and near Vienna and is executed in Renaissance style

FORSTER, RICHARD (1843–) A German philologist and archæologist. He was born at Gorlitz and was educated at Jena and Breslau In 1890 he was appointed professor of classical philology and in 1899 of archæology at the University of Breslau His works include *Der Raub und die Rückkehr der Persephone* (1874), *Farnesina-Studien* (1880), *Scriptores Physiognomici Græci et Latini* (1893), *Libanii opera* (1903–13), and he edited Moritz von Schwindt's *Philostratische Gemalde* (1903) and J C Handke's *Selbstbiographie* (1911)

FORSTER, WENDELIN (1844–). A German philologist and Romance scholar, born at Wildschutz, Bohemia, and educated in Vienna He was professor at Vienna and Prague from 1874 to 1876 and at Bonn after 1876 One of his most noteworthy achievements has been the definite establishment of the Breton origin of the Arthurian legend His numerous publications of the older French writers include *Elie de Saint Gille* (1876–82), *Li Chevaliers as deus espees* (1877), *Altfranzosische Bibliothek*, vols i–xi (1879–87), *Romanische Bibliothek*, vols i–xx (1888–1913), *Die sammtlichen Werke von Christian von Troyes*, vols i–iv (1884–99), *Worterbuch zu Christian von Troyes* (1914)

FORSTER, WILHELM (1832–). A German astronomer, born at Grunberg, Silesia He studied at Berlin and Bonn, became professor of astronomy at Berlin in 1863, and was director of the observatory from 1865 to 1903 In 1868 he was also appointed director of the commission established by the North German Confederation for the determination of standards of measurement In this capacity he superintended the reorganization of the German system of weights and measures on the metric basis He was elected president of the International Bureau of Weights and Measures in 1891 In 1892 he assisted in founding the German Society for Ethical Culture His publications include *Populare Mitteilungen* (1879–84), *Sammlung von Vortragen und Abhandlungen* (4 parts, 1876–96), *Studien zur Astrometrie* (1888), *Lebensfragen und Lebensbilder* (2 vols, 1902–04)

FOR'STER, WILLIAM (1784–1854). An English Quaker philanthropist, born at Tottenham He became a preacher in the Society of Friends, labored in the United States, England, and France, and in 1846 went to Ireland to relieve the distress there caused by famine In 1849 he was commissioned by the Quaker Yearly Meeting in London to present an address on slavery and the slave trade to rulers of the Christian nations, and within the next few years he had interviews with nearly all the monarchs of Europe, with the President of the United States, and with the governors of a number of the Southern States Consult Seebohm (ed), *Memoirs of the Life of William Forster* (2 vols, London, 1865)

FORSTER, WILLIAM EDWARD (1818–86) An English statesman, the only son of William Forster, the Quaker missionary, and of his wife, a sister of Sir Thomas F. Buxton He was born

at Bradpole, Dorsetshire, was educated in Friends' schools at Bristol and Tottenham, and entered the woolen business at Bradford in 1841, where in the following year he formed a partnership with William Fison in that business, which continued to the end of his life In 1850 he married a daughter of Thomas Arnold of Rugby and was excommunicated from the Society of Friends He was defeated in 1859, when he stood for Leeds, but in 1861 he was elected from Bradford to the House of Commons and continued to hold his seat by successive reelections until his death Forster at once took a prominent part in parliamentary debates and became one of the principal leaders of the advanced Liberals He often spoke on the question of the reform of the suffrage, and on the outbreak of the Civil War in America, with Cobden and Bright, earnestly opposed every attempt to recognize the Confederacy, and denounced the government's action in permitting vessels of the *Alabama* type to be built and fitted out in English ports In 1865 he became Undersecretary of State for the Colonies in Lord Russell's ministry, and in 1868 was appointed by Gladstone Vice President of the Council on Education and Privy Councilor In 1869, in spite of opposition from Radicals both in the Church of England and among Dissenters, he secured the passage of the Endowed Schools Bill, and in 1870 introduced the Elementary Education Bill, which he had prepared and which is the foundation of the existing national system of education in England In 1872 he introduced and piloted through the House of Commons the Ballot Bill He visited Turkey for the second time in 1876 and thereafter took so moderate a position on the Eastern Question as to put him partly out of sympathy with Gladstone In the Gladstone ministry of 1880, against his own inclination, he accepted the position of Chief Secretary for Ireland In 1881 he introduced his drastic bill "for the protection of person and property in Ireland" (passed March 2) During the winter of 1881–82 several attempts were made on Forster's life by the "Invincibles," but he remained resolutely at his post. In May, 1882, when a majority of the cabinet determined upon the release of Parnell and the other imprisoned leaders, Forster and Lord Cowper, the Lord Lieutenant, protested and resigned Although Forster continued to take part in the debates in Parliament—drawing particular attention by his bold attacks on Parnell—and was reelected as a Liberal by his constituents in November, 1885, he acted on many questions independently of his party, and opposed the Gladstone Home Rule programme He favored Imperial federation as early as 1875 and was first president (1884) of the Imperial Federation League There is a statue of him in the city of Bradford Consult Wemyss Reid, *Life of the Right Hon W E Forster* (5th ed, London, 1889)

FORSYTH, fôr-sīth′, ANDREW RUSSELL (1858–) An English mathematician, born at Glasgow He was educated at Liverpool College, and at Trinity College, Cambridge, where he was senior wrangler and first Smith's prizeman He was made fellow of Trinity in 1881, was professor of mathematics at University College, Liverpool, from 1882 to 1883, and lecturer in Trinity College, Cambridge, from 1884 to 1895 He was made a fellow of the Royal Society in 1886 and succeeded Cayley as Sadlerian professor of pure mathematics at Cambridge in 1895 He resigned this position a few years later and became in 1913 professor in the Imperial College of Science and Technology, London His principal publications are *Treatise on Differential Equations* (1885), *Theory of Differential Equations* (1890, 2d ed, 1901), *Theory of Functions of a Complex Variable* (1893, 2d ed, 1900), *Lectures on the Differential Geometry of Curves and Surfaces* (1912) He has also published numerous memoirs on differential equations and the theory of functions, in the *Transactions of the Cambridge Philosophical Society* and in the *Philosophical Transactions of the Royal Society* (London)

FORSYTH, GEORGE ALEXANDER (1837–1915) An American soldier, born at Muncy, Pa At the outbreak of the Civil War he enlisted as a private in the Chicago Dragoons He fought throughout the war successively in the Army of West Virginia, that of the Potomac, and that of the Shenandoah, and was four times wounded in service He rose to be brevet brigadier general of volunteers in 1865, was brevetted lieutenant colonel, United States army, in 1867 (for gallantry at Dinwiddie Court House) and lieutenant colonel of the Fourth United States Cavalry in 1881 He was brevetted brigadier general in the regular army in 1868 for conduct in battle with hostile Indians In 1875–76 he was a member of the board of officers appointed to inspect the armies of Europe and Asia, and from 1866 until his retirement in 1890 was on staff and frontier service He published *Thrilling Days in Army Life* (1900) and *The Story of the Soldier* (1900)

FORSYTH, JAMES WILLIAM (1836–1906). An American soldier, born in Ohio. He graduated at the United States Military Academy in 1856, in the Civil War served as captain on the staff of Major General McClellan during the Peninsular and Maryland campaigns, was brevetted major for gallant services at Chickamauga, and in 1864–65 was assistant adjutant general of volunteers and chief of staff of Major General Sheridan. In 1865 he had attained the rank of brigadier general of volunteers and brevet brigadier general, United States army He was assistant inspector general of the Department of the Gulf in 1866–67 and in 1869–73 was aid to Lieutenant General Sheridan From 1873 to 1878 he was military secretary of the Division of the Missouri, in 1886 became colonel of the Seventh United States Cavalry, and in 1894 brigadier general, and in 1897 was retired with commission as major general He published, with F D Grant, a *Report of an Expedition up the Yellowstone River* (1875)

FORSYTH, JOHN (1780–1841) An American politician He was born at Fredericksburg, Va, graduated at Princeton in 1799, and in 1802 was admitted to the bar at Augusta, Ga. He became Attorney-General of the State in 1808 and served as a Democrat in Congress from 1813 to 1818, when he was chosen United States Senator In 1819 President Monroe appointed him United States Minister to Spain At Madrid he concluded the negotiations for the sale of Florida to the United States. On his return to the United States in 1822 he was again elected to Congress and was reelected in 1824 In 1827 he was elected Governor of Georgia and in 1829 was for a second time sent to the United States Senate He advocated Jackson's measures and in 1834 was appointed Secretary of

State and resigned his seat in the Senate He was head of the State Department during the remainder of Jackson's administration and was continued in office through the entire administration of President Van Buren, whose friendship he had won in 1831 when the Senate refused to confirm his nomination as Minister to England

FORSYTH, PETER TAYLOR (1848–) A British Congregational clergyman He was born in Aberdeen, studied and taught in the University of Aberdeen, and then studied at Gottingen under Ritschl—who influenced him probably even more than did F D Maurice—and at New College, Hampstead Among his charges were churches in Manchester, Leicester, and Cambridge In 1901 he became principal of Hackney Theological College, Hampstead His Lyman Beecher lectures at Yale University in 1907 were published under the title *Positive Preaching and Modern Mind* He published, besides *The Person and Place of Christ* (1909, Congregational Union lecture for 1909), *The Work of Christ* (1911), *Christ on Parnassus* (1911), *Faith, Freedom, and the Future* (1912), *The Principle of Authority* (1913) Consult Hermann in *Homiletic Review* (New York, 1913)

FORSYTH, SIR THOMAS DOUGLAS (1827–86) An Anglo-Indian legislator, born at Birkenhead and educated at Sherborne, Rugby, Haileybury, and Calcutta He was in 1860 appointed commissioner in the Punjab, was sent to St Petersburg in 1869 about the Afghan boundaries, in 1870 and 1873 went on missions to Yarkand which were of great scientific importance, and in 1872 had the task of suppressing the insurrection at Malair Kotla In 1873 he was appointed envoy to Kashgar and in 1875 was sent in the same capacity to the King of Burma to effect a settlement of the question of the Karens. Consult his *Autobiography* (London, 1887), edited by his daughter

FORSYTH, WILLIAM (1812–99) An English author, born at Greenock, Scotland, and educated at Trinity College, Cambridge, where he took his M A in 1837 From 1859 to 1872 he was standing counsel to the Secretary of State for India, and from 1874 to 1880 was a member of Parliament from Marylebone He was editor of the *Annual Register* from 1842 to 1868 His published works include *On the Law of Composition with Creditors* (1841), *Hortensius* (1849, 2d ed, 1874), an historical sketch of the bar from the earliest times, *History of Trial by Jury* (1852), *History of the Captivity of Napoleon at St. Helena* (1853), *Civil Liberty and Self-Government* (1856), *Life of Cicero* (1863), *Novels and Novelists of the Eighteenth Century* (1871), *Hannibal in Italy* (1872), an historical drama in verse, *Essays, Critical and Narrative* (1874), *The Slavonic Provinces South of the Danube* (1876)

FORSYTHIA, fôr-sĭth'ĭ-a (Neo-Lat, named in honor of William Forsyth, a Scottish botanist) A genus of shrubs of the family Oleaceæ, *Forsythia viridissima, Forsythia fortunei,* and *Forsythia suspensa,* small Chinese shrubs now commonly cultivated under the names "golden bell" and "golden rain" They are hardy and noticeable for their yellow flowers, which appear before the leaves

FORT. In the United States all permanently garrisoned posts, whether fortified or not, are called forts In 1914 there were 159 of these posts, some of the most important of which are described in the following pages For a list of garrisoned posts in the United States and foreign possessions, giving post office, telephone, telegraph, and railroad communication, consult the monthly *Army List and Directory,* issued by the Adjutant General's Office, Washington, D C In fortification (q v), the term *fort* is usually applied to a work entirely inclosed by defensible parapets and of great strength, either by reason of its trace or its armament If the trace is the outline of a *star,* we have a *star fort,* if it includes bastions, a *bastioned fort*

FORT AD'AMS A United States military post, situated at Brenton's Point, Newport, R I, the site of which was first occupied for defensive purposes during the Revolutionary War and by a permanent garrison in 1799 In 1914 it was the headquarters of the coast defenses of Narragansett Bay and had a garrison of five companies of coast artillery in 1914

FORTALEZA, fôr'ta-lā'za (from Fort Alexis), or **CEARÁ.** The capital of the State of Ceará, Brazil, situated on an open bay, near the mouth of the Rio Ceará (Map Brazil, K 4) It is regularly built, with broad and well-paved streets, and is one of the most beautiful cities of Brazil Though surrounded by a sterile region, it is connected by rail with fertile inland sections The harbor is subject to constant silting and is difficult of access, but these defects are being remedied by extensive harbor works Fortaleza is the chief port of the State, and has an active trade in rubber, cotton, drugs, coffee, sugar, and animal products The first settlement here was a fort established by Amparo, in 1611, to hold the Indians in check and to prevent the Dutch from gaining a foothold in this vicinity. The city is the residence of a United States consul Pop (est), 50,000.

FORT AN'CIENT A prehistoric Indian fortification in Warren Co, Ohio, which is now preserved in a State park Consult Shepherd, *Antiquities of Ohio* (Cincinnati, 1887), and Moorehead, *Fort Ancient* (Andover, Mass, 1908), which contains a bibliography

FORT AN'DREWS. A United States military post, forming one of the defenses of Boston Harbor, Mass, and consisting of a reservation of 33 13 acres established in 1901 It is 9 miles distant from the city of Boston, which serves as the nearest telegraph and railway station, there being a post office at the post The usual garrison is five companies of coast artillery

FORT ANN. A village in Washington Co, N Y, 67 miles by rail north of Troy, on the Champlain Canal, and on the Delaware and Hudson Railroad (Map New York, G 4) It is a summer resort, and manufactures knit goods, lumber, and condensed milk Pop, 1900, 431, 1910, 436 In 1690 Fitz-John Winthrop, in his expedition against Canada, fortified a camp here A fort, called Fort Peter Schuyler, was built here by Colonel Nicholson on his Canadian expedition in 1709 and was rebuilt in 1757 and named Fort Ann In 1758, during the French and Indian War, Captain Robert Rogers defeated near here the French and Indians under Marin, and in 1777, during the Revolutionary War, a small force of Americans under Colonel Long, fleeing from Ticonderoga, was defeated here by the British, who occupied and partly destroyed the fortifications Fort Ann was incorporated as a village in 1820

FORT ASSINNIBOINE, ăs-sĭn'ĭ-boin A former United States military post situated on the Great Northern Railway, 7 miles distant from Havre, Montana The reservation numbers about 222,000 acres In 1912 this reservation was relinquished by the War Department and turned over to the Interior Department

FORT AT'KINSON A city in Jefferson Co, Wis, 55 miles west-southwest of Milwaukee on the Chicago and Northwestern Railroad, and on Rock River (Map Wisconsin, E 6) It is in an agricultural region and has knitting mills, meat-packing houses, and manufactures harrows, ventilators, dairy machinery, chairs, sleighs, carriages, and creamery products It is governed by a biennially elected mayor and a unicameral council and has municipal water works and electric-light plant The city derives its name from a fort built there in 1836 by General Atkinson during the Black Hawk War. Pop, 1900, 3043, 1910, 3877

FORT BA'KER. A United States military post, a part of the defenses of San Francisco harbor, and situated near Sausalito, Cal, 6 miles from the city of San Francisco It was established in 1899 and consists of 1899 66 acres. The garrison consists of three companies of coast artillery (1914)

FORT BANKS A United States military post located at Winthrop, Mass, established in 1889 as a part of the defenses of Boston harbor It is seven miles distant from Boston It had in 1914 a garrison of two companies of coast artillery and an armament of 16 12-inch breech-loading mortars

FORT BARRAN'CAS A United States military post situated in the harbor of Pensacola, Fla, 8 miles distant from the town of that name It was established in 1870, and connected with it are the two subposts of Fort Dickens and Fort McRee Fort Barrancas is the headquarters of the Artillery District of Pensacola and has (1914) a garrison of four companies of coast artillery

FORT BAY'ARD A United States military reservation in New Mexico, no longer a garrisoned post, but a general military hospital for the treatment of pulmonary tuberculosis It has a post office and telegraph station and is 2 miles distant from the railway station of Bayard The military reservation, which comprises about 520 acres, was established as a post in 1866, but in 1900 was discontinued and turned over to the surgeon-general for hospital purposes, a detachment of the hospital corps forming its garrison

FORT BENJAMIN HARRISON A United States military post located at Indianapolis, Ind, 10 miles from the city

FORT BLISS. A United States military post situated at El Paso, Texas, with a garrison whose strength and character vary with conditions on the Mexican frontier In 1914 all mobile arms of the service were stationed here

FORT BOW'YER A fort, formerly situated on Mobile Point, at the entrance to Mobile Bay It was built by General Wilkinson in April, 1813, was garrisoned by General Jackson with 160 men under Major William Lawrence, and on Sept 14, 1814, was unsuccessfully attacked by a small naval and land force under Capt W H Percy On Feb 8, 1815, after the battle of New Orleans, it was again attacked by the British, and on the 11th it surrendered Consult Adams, *History of the United States*, vol viii (New York, 1889–91), and Lossing, *Pictorial Field Book of the War of 1812* (ib, 1868)

FORT BRA'DY A United States military post, established in 1822, comprising 75 acres and located 1 mile from Sault Ste Marie, Mich, and having a garrison of an infantry detachment (1914)

FORT BRAGG A city in Mendocino Co, Cal, 125 miles (direct) north of San Francisco, on the lines of the National Steamship Company and the California Western Railroad and Navigation Company (Map California, B 3) It contains a public library and has extensive lumbering mills, canning works, and creamery, tank factory, sash and door stock shops, and bottling works The city was named after Gen Braxton Bragg, who was stationed at the government post then here, succeeding Capt U S Grant The water works are owned by the municipality Pop, 1900, 1590 1910, 2408

FORT BROWN A former United States military post situated on the frontier at Brownsville, Tex, for many years In 1911 it was relinquished by the War Department and turned over to the Interior Department

FORT CAN'BY A United States military post, established in 1864, on the north side of the mouth of the Columbia River, Washington, and a subpost of Fort Stevens, Oreg, 10 miles distant It was originally called Fort Cape Disappointment, but the name was changed to Canby in honor of the distinguished officer of that name, killed by the Modoc Indians Its garrison was temporarily withdrawn in 1905–06 while the post was rebuilding and in 1914 was a detachment of coast artillery Communication is had by steamer and Northern Pacific Railroad with Portland, Oreg, 114 miles, and Seattle, Wash, 222 miles

FORT CA'SEY A United States military post, situated at Port Townsend, Washington, 53 miles from Seattle, on Puget Sound, with a garrison of three companies of coast artillery in 1914 and mounting important coast defenses

FORT CASWELL, kăz'wĕl A United States military post, established, 1825, on Oak Island, at Southport, N C, 27 miles from Wilmington, N C, with a garrison of three companies of artillery in 1914

FORT CHIP'PEWY'AN, or **CHIPEWAYAN** A trading station of the Hudson's Bay Company at the southwest end of Lake Athabasca, Province of Alberta, Canada, opposite the mouth of the Athabasca River (Map Canada, H 5) It is one of the most populous of the far northern stations, owing to the location here of a mission containing about 100 hardy orphans, sent thither to be trained as future colonists

FORT CHURCH'ILL A trading station of the Hudson's Bay Company, at the mouth of the Churchill River on the west shore of Hudson Bay (q v) (Map Canada, M 5)

FORT CLARK. A United States military post, established 1852, on Las Moras Creek, near Brackettville, Tex, which is the post office The reservation comprises 3963 acres, it is 125 miles west of San Antonio on the Southern Pacific Railroad It was designed for the protection of the San Antonio and Eagle Pass wagon road and for the protection of the Rio Grande border against depredations by Mexicans and Indians. In 1914 two squadrons were stationed here

FORT CLIN'TON. A Revolutionary fort on the Hudson, near West Point, intended to make the river impassable for the British fleet in 1777

FORT COL'LINS A city and the county seat of Larimer Co, Colo, 74 miles by rail north of Denver, on the Cache la Poudre River, and on the Union Pacific and the Colorado and Southern railroads (Map Colorado, D 1) It is the seat of the State Agricultural College, opened in 1879, and connected with which is a United States horse-breeding station A theological seminary (Lutheran) and the headquarters of the Colorado National Forest are also situated here Other features include a Carnegie library, Federal building, courthouse, hospital, and several fine parks The city is the centre of a fertile region, watered by extensive and efficient systems of irrigation It has a large beet-sugar factory, alfalfa and flour mills, brick and tile works, and a steel-headgate plant Fort Collins adopted the commission form of government in 1913 The water works are owned by the city. Pop, 1900, 3053, 1910, 8210, 1914 (U S est), 10,407

FORT COLUM'BUS. See FORT JAY

FORT CROOK A United States military post, situated on the Burlington and the Missouri Pacific railways in Nebraska, and having (1914) a garrison of a detachment of infantry

FORT D. A. RUS'SELL A United States military post in Wyoming established in 1867, occupying a reservation of 4400 acres on a branch of the South Platte River, 3 miles from Cheyenne, on the Union Pacific Railroad The post was increased to accommodate a brigade and has for its garrison bodies of troops varying in strength, but usually a force of cavalry

FORT DA'VIS A garrisoned post of two companies, situated 3 miles east of Nome, Alaska.

FORT DEAR'BORN A fort built on the site of Chicago in 1804–05, well known from a massacre which occurred near by, on Aug. 15, 1812 On that day the garrison of 67 men, under Capt Nathan Heald, evacuated the fort, under injudicious orders from Gen William Hull, and, accompanied by the resident settlers, some 30 in number, including women and children, started for Detroit under the escort of a body of Miami Indians At a short distance from the fort they were attacked by an ambushed force of about 500 Indians, assisted by most of the escort, and two-thirds of their number were killed and the rest captured Most of the captives were subsequently ransomed at Detroit The fort was destroyed on the following day by the Indians, was rebuilt about 1816, was evacuated in 1823, was reoccupied in 1828, and was demolished in 1856 Consult Wentworth, *Early Chicago, Fort Dearborn* (Chicago, 1881), Kirkland, *The Chicago Massacre of 1812* (ib, 1893), an interesting narrative in Kinzie, *Wau-bun, or the Early Day, in the Northwest* (ib, 1857), the version, largely from the Indian standpoint, in an article, "The Massacre of Fort Dearborn, Gathered from the Traditions of the Indian Tribes Engaged in the Massacre," by Simon Pokagon, in *Harper's Magazine*, vol xcviii (New York, 1899), Quaife, *Chicago and the Old Northwest, 1673–1835 A Study of the Evolution of the Northwestern Frontier, together with a History of Fort Dearborn* (Chicago, 1913)

FORT DE FRANCE, fôr de fraNs (formerly Fort Royal) The capital of Martinique (q v), situated on the west coast of the island (Map West Indies, G 4) It has a good harbor and is strongly fortified In 1902 Fort de France became important as the distributing centre for supplies during the terrible eruptions of Mont Pelée (q v) Pop, 27,069

FORT DE L'ÉCLUSE, fôr de lā'kluz' A fortress in the French Department of Ain, about 14 miles south of Geneva It was erected by the dukes of Savoy, but was repeatedly destroyed by the Swiss during the sixteenth century Rebuilt by Vauban at the command of Louis XIV, it was dismantled by the Austrians in 1815, but has been restored and strengthened It occupies a crag 1385 feet high, at the foot of Mont Credo, which commands the passage of the Rhône from Switzerland through the defile of the Ecluse

FORT DES MOINES, de moin' A United States military post, 5 miles distant from the city of the same name in the State of Iowa The post is of modern construction throughout and is usually garrisoned by an entire regiment of cavalry

FORT DODGE A city and the county seat of Webster Co, Iowa, 89 miles north by west of Des Moines, on the Minneapolis and St Louis, the Illinois Central, the Fort Dodge, Des Moines, and Southern, and the Chicago Great Western railroads, and on the Des Moines River (Map Iowa, C 2) Fort Dodge contains Tobin College, St Joseph's Mercy Hospital, a fine courthouse, and a Carnegie library It is an important railroad centre and has great natural advantages In the vicinity are vast coal fields, large deposits of glass sand and excellent clay, and quarries of brown sandstone The city has extensive manufactures of gypsum and clay products, prints, brick and tile, foundry products, oatmeal, pottery, shoes, work clothing, etc. There are also greenhouses, with a large wholesale trade, and repair shops of the four railroads which enter the city Fort Dodge adopted the commission form of government in 1911 It owns the water-works system Pop, 1900, 12,126, 1910, 15,543, 1914 (U S est), 16,872, 1920, 19,347.

FORT DON'ELSON. See FORT HENRY AND FORT DONELSON

FORT DOUG'LAS A United States military post in Utah, established in 1858 and occupying a reservation of 9250 acres at the base of the Wahsatch Mountains, 5030 feet above the sea It was established to prevent depredations by Indians along the line of the overland mail route There are a post office at the post, and a telegraph station at Salt Lake City, 3 miles distant It is 37 miles from Ogden on the Union Pacific Railroad and has quarters for 500 cavalry or infantry, its garrison varying in strength

FORT DU PONT A United States military post in Delaware occupying a reservation of 173 acres opposite Pea Patch Island in New Castle County The nearest post office and telegraph station are at Delaware City, Del The garrison in 1914 was three companies of coast artillery

FORT DU QUESNE, dụ'kān'. See PITTSBURGH

FORTE, fôr'tā. In music, the Italian term for loud, *fortissimo*, very loud or forcible In scores these expression marks are designated respectively by f and ff Occasionally a double fortissimo (fff) is required, especially in piano arrangements of orchestral works

FORT ED'WARD A village in Washington Co, N Y, 56 miles north of Albany, on the Delaware and Hudson Railroad and on the

Barge Canal (Map New York, G 4) By means of a dam at this point the Hudson River furnishes good water power, and the village has extensive paper and pulp mills, a shirt factory, a brewery, a pottery, etc First incorporated in 1849, Fort Edward is governed under a charter of 1857, which provides for a president, chosen annually, and a board of trustees, elected on a general ticket The water works are owned by the municipality Pop, 1900, 3521, 1910, 3762.

The site of Fort Edward was known to the French and English in the latter part of the seventeenth century and the early part of the eighteenth as the Great Carrying Place because of its accessibility to Lakes George and Champlain In 1709 Colonel Nicholson, while on his unsuccessful expedition against Canada, built a stockade on the spot This fell into decay, but in 1755, during the French and Indian War, another fort, called Fort Lyman at first after its builder, but soon renamed Fort Edward in honor of the Duke of York, was erected here. In 1757 the survivors of the Fort William Henry massacre took refuge within its walls Throughout the French and Indian War and the Revolution the fort was the starting point for expeditions against Canada In 1777 it was for some time the headquarters of General Schuyler and later was occupied by General Burgoyne Near here, on July 27, 1777, Jane McCrea (q v) was killed by the Indians. Consult Parkman, *Montcalm and Wolfe* (Boston, 1884), "Fort Edward in 1779–80," in the *Historical Magazine*, 2d series, vol ii (ib, 1867), *The Fort Edward Book* (Fort Edward, 1903).

FORTEGUERRI, fōr'tā-gwĕr'rē, NICCOLÒ (1674–1735) An Italian poet, born at Pistoia Being a younger son, he was destined for the church, and in 1695 he was sent to Rome to his uncle, Cardinal Fabroni. He accompanied an embassy to Spain, and, now in favor and again disgraced, occupied successively many ecclesiastical offices, being secretary of the Propaganda when he died During his life only a few of his rhymes and prayers were published His more important works, the *Capitoli*, the *Epistole poetiche*, and the comic epic *Il Ricciardetto* (1738), written under the pseudonym Carteromaco, were published posthumously We owe to him also a blank-verse translation into Italian of the comedies of Terence (1736) In his original works, which, as the form shows, are largely improvised, the comic element predominates, though bitter attacks upon the monastic orders are not infrequent Consult the edition of his works in the *Classici italiani* (Milan, 1813), to which is prefixed an Italian translation of Fabroni's biography in Latin, and C Zacchetti, *Il Ricciardetto di Niccolo Forteguerri* (Torino, 1899)

FORT E'RIE. A fort, formerly situated in Canada, at the head of the Niagara River, opposite Buffalo, N Y, on the site of the present village of the same name (pop 1911, 1146); the scene of considerable fighting in the War of 1812 It was abandoned and partially destroyed by the British on May 28, 1813, and in the succeeding two months was occupied alternately by the Americans and the British On July 3 it was captured, with a garrison of 170 men, by the American General Jacob Brown (q v), and after the battle of Lundy's Lane, July 25, 1814, the whole American army, numbering about 2000 men, was withdrawn thither by General Ripley, who was soon replaced by General Gaines. During their stay the fortifications were completed for the first time The British under General Drummond advanced to attack, and from August 7 to August 14 kept up an almost constant bombardment On Nov 5, 1814, the fort was blown up by the Americans, and it was never subsequently rebuilt Consult Adams, *History of the United States*, vols vii and viii (New York, 1889–91), and Dawson, *Battles of the United States* (ib, 1858)

FOR'TESCUE, CHICHESTER SAMUEL. See CARLINGFORD, CHICHESTER SAMUEL FORTESCUE, BARON

FORTESCUE, HUGH, third EARL FORTESCUE (1818–1905) An English author and politician, born in London and educated at Harrow and at Trinity College, Cambridge Lord Melbourne made him his private secretary in 1840 Elected in 1841 a member of Parliament, he was continued in the Lower House, except in 1852–54, until shortly before he succeeded to his father's title (1859, he had been Viscount Ebrington since 1841) and took his seat in the House of Lords (1861) He was a Lord of the Treasury in 1846–47, and Secretary of the Poor Law Board from 1847 to 1851 In politics he was a Liberal and a Liberal Unionist He wrote several pamphlets, including *Lectures on the Health of Towns* (1845), *Official Salaries* (1851), *Representative Self-Government for London* (1854), *Public Schools for the Middle Classes* (1864), *Our Next Leap in the Dark* (1884)

FORTESCUE, SIR JOHN (c 1394–c 1476) An English judge, who came of an old Devonshire family and received his education at Exeter College, Oxford He was King's serjeant at law in 1430 and in 1442 became Chief Justice of the King's Bench It is known, from many records of the time, that in the early part of his career Fortescue was popular as a judge, but later fell into disfavor, because he belonged to the court party, hence he also supported Henry VI against Richard of York, and later against Edward IV Many of his works were written to support the Lancastrian claims Until the final defeat of the house of Lancaster at Tewkesbury, in 1471, he shared all their fortunes, and during the wanderings abroad, where Fortescue seems to have received the empty title of Chancellor from Henry VI, he wrote, for the instruction of young Prince Edward, his celebrated work, *De Laudibus Legum Angliæ*, a masterly eulogy of the laws of England At Tewkesbury he fell into the hands of Edward IV, who pardoned him He died at an advanced age, but the date has not been ascertained A valuable and learned work by Fortescue, written in English, discussing the differences between an absolute and limited monarchy, was reedited by Plummer in 1885, under the title *The Governance of England* His other works are numerous, but have little interest Consult Plummer, introduction to *The Governance of England* (Oxford, 1885), Gairdner, *The Paston Letters* (London, 1872–75), Clermont's edition of Fortescue's works, in which all writings attributed to Fortescue are published (ib, 1869), Foss, *Lives of the Judges* (Boston, 1870), Oman, *History of England from Accession of Richard II to Death of Richard III, 1377–1485* (London, 1906).

FORTESCUE, SIR JOHN (c.1531–1607). An English statesman, son of Sir Adrian Fortescue, great-grandson of Sir John, the Chief Justice, and a distant cousin of Queen Elizabeth. His

father was executed in 1539, but the son—possibly educated at Oxford—had his property restored by an Act of Parliament in 1551 During Mary's reign his mother was in favor, and he was appointed instructor to the Princess Elizabeth On the accession of Elizabeth he was made keeper of the great wardrobe He entered Parliament in 1572, in 1589 succeeded Mildmay as Undertreasurer and Chancellor of the Exchequer a very lucrative post, was knighted in 1592, and in 1601 became Chancellor of Lancaster This post in the Exchequer he lost when James came to the throne, but the patents for the other two offices were reissued, and he twice entertained the King In 1604 he was candidate for the seat for Buckinghamshire in an election declared void by the Court of Chancery (because Fortescue's opponent was outlawed), he was returned on a second election The Commons challenged the right of Chancery to decide in such a case, and after compromise on a third election Fortescue was returned in 1606 He was an honest and able administrator—Queen Elizabeth said he outdid her expectation "for integrity"—no mean scholar, and an intimate friend of Sir Thomas Bodley, whose library owed much to Fortescue.

FORT E'THAN AL'LEN A United States military post in Vermont, established in 1892 and occupying a reservation of 761 acres The post office is Essex Junction, Vt, distant 2 miles, and the nearest telegraph station is Burlington, Vt (6 miles away) There are quarters for a substantial force of cavalry and artillery and adequate stables In 1914 a full regiment of cavalry was quartered here

FORT FAIR'FIELD A town in Aroostook Co, Me, 140 miles north of Bangor, on the Bangor and Aroostook and the Canadian Pacific railroads, and on the Aroostook River (Map Maine, E 2) It contains a Carnegie library, picturesque falls, and the old fort site The town is a rich agricultural region, producing large quantities of potatoes. Pop, 1900, 4181, 1910, 4381

FORT FISH'ER An earthwork in North Carolina, on the peninsula between the Atlantic Ocean and Cape Fear River, defending the entrance to the port of Wilmington In the last year of the Civil War this was almost the only port open to the Confederates, and it became a matter of importance to the Federals to close it To this end a formidable fleet under Admiral Porter left Hampton Roads on Dec 13, 1864, and arrived in sight of the fort on December 20 At 1 40 A M on the 24th the powder boat *Louisiana*, laden with 215 tons of powder, was exploded within 200 yards of the beach and 400 yards of the fort, but the latter sustained no appreciable damage Later in the day the fleet opened fire, and in a little over an hour the guns of the fort were silenced On the 25th the bombardment was renewed in order to cover the landing of the land forces under Gen Benjamin F Butler, but though a reconnoitring force went within 150 yards of the fort, an assault was deemed unadvisable, and the troops reembarked and returned to James River The fleet, however, remained near the fort, and on Jan 13, 1865, another military force of 8000 men, under command of Gen A H Terry, was landed. The bombardment was renewed on the 13th and 14th, and on the 15th a joint assault of soldiers, sailors, and marines carried the fort, capturing more than 2000 prisoners and 169 guns The Union loss was 266 killed and 1018 wounded Early on the 16th a magazine explosion, probably the result of an accident, killed more than 100 of the Federals and about as many of the Confederates The Confederates then blew up their remaining works, the control of the mouth of Cape Fear River passed from their hands, and Wilmington was evacuated Consult Ammen, *The Atlantic Coast* (New York, 1883), and Johnson and Buel, *The Battles and Leaders of the Civil War*, vol iv (ib, 1887)

FORT FLAGLER. A United States military post, a part of the defenses of Puget Sound, situated at Port Townsend, Washington, 53 miles by boat from Seattle, and having a garrison of three companies of coast artillery

FORT GAINES See MOBILE BAY, BATTLE OF

FORT GAINES A city and the county seat of Clay Co, Ga, 140 miles southwest of Macon, on the Chattahoochee River and on the Central of Georgia Railroad (Map Georgia, A 4) It is the centre of a cotton and fruit-growing region and has cottonseed-oil mills, brickyards, fertilizer factories, etc The water works and electric-light plant are owned by the city Pop, 1900 1305, 1910, 1320

FORT GARRY See WINNIPEG

FORT GEORGE A fort, formerly situated on the Canadian side of the Niagara River almost opposite Fort Niagara (q v), and in the village of Newark (now Niagara). On May 27, 1813, it was taken by an American force of 6000 under the actual command of Col Winfield Scott and Commodore Perry (the commanding officer General Dearborn, being ill) On December 10 the fort was evacuated by General McClure, to avoid an attack by a superior British force Consult Dawson, *Battles of the United States* (New York, 1858), and Lossing, *Pictorial Field Book of the War of 1812* (ib, 1869)

FORT GIB'BON A garrisoned post of three companies, situated on the north bank of the Yukon River, Alaska, at its junction with the Tanana Adjoining it is the town of Tanana (pop, 398 in 1910), and also the St James (Episcopal) mission

FORT GRANT. A former United States military post in Arizona, occupying a reservation of 42,341 acres, originally called "Camp Grant," 26 miles from Wilcox, Ariz In 1911 it was relinquished by the War Department and turned over to the Interior Department It is situated 2500 feet above the sea, 56 miles north of Tucson, and was established about 1863 by the California Volunteers as a protection against the Apaches to the southern line of travel to California Old Fort Grant was established in 1865, the new Fort Grant in 1872

FORT GRE'BLE. A United States military post on Dutch Island, R I, in Narragansett Bay There is a post office at the post, and the telegraph and railway station is Newport, R I The garrison in 1914 consisted of three companies of coast artillery The post is named after Lieutenant Greble, U S A, killed at the battle of Big Bethel, Va, in 1861

FORT GRISWOLD, griz'wold, Conn See GROTON

FORTH A river and estuary of Scotland. The river is formed by the junction near Aberfoyle of two main head streams—the Duchray Water, 16 miles long, and the Avondhu, 12 miles long, which rise in the mountains between Lochs Katrine and Lomond in the northwest of Stirlingshire (Map Scotland, D 3) It traverses

a country rich in romantic scenery From Aberfoyle the Forth winds 39 miles southeasterly across the Carse of Stirling to Stirling, and at Alloa, 12 miles beyond, widens into the Firth of Forth (Map Scotland, F 3) The Firth extends 6 miles southeast, then, with an average breadth of 2½ miles, continues 10 miles to Queensferry, where it contracts to a mile in width and is spanned by the celebrated cantilever railway bridge, 8295 feet long, with two main spans of 1710 feet each, opened in 1890 A little to the west of the Forth Bridge is the modern naval base of Rosyth The Firth extends 36 miles farther to the North Sea, expanding in width to 15 miles The river is navigable to Alloa by vessels of 300 tons and to Stirling by vessels of 100 tons A canal 38 miles long connects it with the Clyde Important salmon and herring fisheries and numerous pleasure resorts are located along its lower course

FORT HAM'ILTON A United States post, established in 1831, on the southwest shore of Long Island It is one of the principal defenses of New York City, commanding "the Narrows" The post-office and telegraph station is Fort Hamilton, Brooklyn, N Y In 1914 the garrison was five companies of coast artillery During the American Revolution the British landed here prior to the battle of Long Island, 1776

FORT HAN'COCK A United States military post established in 1892, at Sandy Hook, N J, and commanding with its high-powered rifles and mortars one of the entrances to New York harbor There are post-office and telegraph stations at the post It was named after Major General Winfield Scott Hancock, U S A, and the fort is the headquarters of the artillery coast defenses of southern New York, embracing also Forts Hamilton and Wadsworth There is an artillery garrison, and in 1914 six companies of coast artillery were stationed here Here is located also the Sandy Hook Proving Ground of the Ordnance Department

FORTH BRIDGE, THE A cantilever bridge erected over the Firth of Forth at Queensferry, Scotland, in 1883–90, famous on account of the length of its spans The two main spans are each 1710 feet long, and the total length of the bridge is 8295 feet The towers are 343 feet in height The bridge contains 51,000 tons of steel, and the whole cost of construction was about $13,000,000 Consult Philip Phillips, *The Forth Bridge in its Various Stages of Construction* (Edinburgh, n d)

FORT HEN'RY AND FORT DON'ELSON. Two forts, 12 miles apart, in Tennessee, prominent in the early period of the Civil War—the first situated on the right bank of the Tennessee River, and the second on the left bank of the Cumberland River, both standing near the line between Tennessee and Kentucky They were built and strongly manned by the Confederates in 1861 and were the two most important works in the first line of defense in the West They were especially important in that they controlled the entrance to two avenues by which Tennessee and the States farther south might be entered Early in 1862 General Grant, stationed at Cairo, asked and received permission to attempt their capture On February 2 a flotilla of gunboats under Com A H Foote, followed by land troops under Grant, left Cairo, and on the 4th arrived before Fort Henry, which was then defended by 3000 men under General Tilghman A combined attack by land and water was planned for the 6th, but the fort was taken within an hour on that day by the naval forces alone, some time before the troops arrived The unavoidable delay of the latter enabled most of the garrison to escape to Fort Donelson, though Tilghman and about 70 of his men surrendered with the fort On the 12th Grant moved upon Fort Donelson with a force that ultimately numbered 27,000 The fort, having been considerably reenforced, had a garrison of between 18,000 and 21,000, including the commands of Generals Floyd, Pillow, and Buckner On the 13th Grant began a cannonade, and on the 14th an attack was also made by the fleet, but within two hours every gunboat was disabled, 54 men were killed, and Foote was compelled to withdraw The Confederates, hoping to open up a way for retreat towards Nashville, attempted a surprise on the morning of the 15th They were at first successful and actually secured a line of retreat, but they failed to profit by it, and at 3 P M Grant, who had been absent during the early part of the engagement, for the purpose of conferring with Commodore Foote, then wounded aboard his flagship, ordered a general advance, drove the Confederates within their own lines, and gained a position within their works About 2000 on each side were killed or wounded in the course of the day Grant prepared for a general assault early the next morning, but the Confederate leaders, recognizing the futility of further resistance, decided to surrender During the night Floyd with about 1500 men, Forrest with 500 or 600, and Pillow with his staff, escaped, leaving the fort in command of Buckner This officer had originally been ranked by both Floyd and Pillow, the former of whom, having his unsavory record as Secretary of War in mind, dreaded to surrender for "personal reasons," while the latter violently opposed the idea of surrendering at all On the morning of the 16th Buckner sent a message to Grant proposing an armistice until noon and the appointment of commissioners to settle upon terms of capitulation Grant returned on the instant the now famous reply "No terms except an unconditional and immediate surrender can be accepted I propose to move immediately upon your works" Buckner had no alternative and at once surrendered the fort with between 12,000 and 18,000 men, at least 40 guns, and a great quantity of ammunition. The terms of Grant's answer aroused the enthusiasm of the North, where, by a play upon the initial letters of his name, he soon came to be known as "Unconditional Surrender Grant" Consult *Official Records*, vol iv (Washington, 1881), Grant, *Personal Memoirs* (New York, 1895), Johnson and Buel, *Battles and Leaders of the Civil War*, vol i (ib, 1887), Force, *From Fort Henry to Corinth* (ib, 1881), Swinton, *Decisive Battles of the War* (ib, 1867), Ropes, *The Story of the Civil War*, part ii (ib, 1898), Steele, *American Campaigns* (Washington, 1909)

FORT H. G WRIGHT. A United States military post, situated on Fisher's Island, 8 miles from New London, and forming a part of the defenses of Long Island Sound. It is the headquarters of the coast defenses of Long Island Sound and has a garrison of six companies of coast artillery.

FORT HOW'ARD. A United States military post, established in 1900, and occupying a reservation of 149 acres. The post office and

telegraph station is Baltimore It is situated at North Point, Patapsco River, 17 miles from Baltimore, and in 1914 had a garrison of four companies of coast artillery

FORTIER, fôr'tyā', ALCÉE (1856–1914) An American scholar, born in St James Parish, La, and educated at the University of Virginia and in Paris In 1880 he became professor of Romance languages at Tulane University (Louisiana), he also taught in a number of university summer schools From 1888 to 1896 he was a member of the Louisiana State Board of Education, and from 1897 to 1902 president of the Catholic Winter School of America He was president of the American Folk-Lore Society (1894), the Modern Language Association of America (1898), and the Federation Alliance Française (1906–07) Besides editing various French texts, he is author of *Le château de Chambord* (1884), *Gabriel d'Ennerich* (1886), *Bits of Louisiana Folk-Lore* (1888), *Sept grands auteurs du XIXme siècle* (1889), *Histoire de la littérature française* (1893, new rev ed, 1913), *Louisiana Studies* (1894), *Louisiana Folk Tales* (1895), *Précis de l'histoire de France* (1899, new rev ed, 1913), *History of Louisiana* (1904), *History of Mexico* (1907)

FOR'TIFICA'TION (Sp. *fortificación*, It *fortificazione*, Fr *fortification*, Lat *fortificatio*, from *fortificare*, to fortify, from *fortis*, strong + *facere*, to make) That branch of military engineering which has to do with the design and construction of temporary and permanent defenses for the protection of military forces under fire The subject may be divided into Field Fortification, which is properly a branch of Military Field Engineering, and Permanent Fortification, the latter being subdivided into Permanent Land Fortification and Seacoast Defense This classification will be observed in the present treatment

FIELD FORTIFICATION

The chief aim of a commander of a military force operating in the field is to have his army not only in the best possible condition, but in the best position for conflict with the enemy In spite of precautions these conflicts may come about through accident, and an army forced to fight or in danger of attack must use every means at its command to strengthen or fortify a position which may or may not be of its commander's choosing Often an unexpected collision of some portion of the force with the enemy may develop into a general battle The army may be surprised in encampment More frequently the commanders of the opposing forces will be in a general way aware of the position and strength of the enemy Each will know whether on the whole he prefers to give battle or to obstruct the progress of his opponent as much as possible without bringing on a general engagement except in positions affording his army natural advantages (See RECONNAISSANCE) The latter course will, in general, be the lot of the weaker The stronger may also strive to occupy positions which the weaker must attack to protect his own supplies The commander expecting to be attacked will select the best available position for his troops—one which the natural advantages of the ground will make it easier for him to hold and more difficult for his opponent to attack A section of the line will be assigned to each corps of division of his army The length of the section thus assigned will vary greatly under different circumstances. Ordinarily not less than six men, including those in the firing line, supports, and reserves, should be allotted for each yard of the line Each subdivision, on reaching the portion of the line assigned to it, proceeds as rapidly as possible to fortify—i e, to make stronger its line. If practicable, the position of the line will be indicated by the engineers, otherwise, it will be inspected as soon as possible with a view to strengthening it, wherever opportunity offers

In the American Civil War, especially towards the latter part, the troops, as soon as they arrived on the line, began the construction of light trenches with their bayonets and cups In several modern foreign armies the troops carry as a part of their equipment small intrenching spades or picks, with which a rifle pit or lying-down trench (Fig 1) is hastily constructed If time allows, this is enlarged, first into a kneeling trench (Fig 2) and then into a standing trench (Fig 3) The protection furnished by such a trench is ample against infantry fire, as 30 inches of earth will stop or deflect a modern rifle bullet See TRENCH

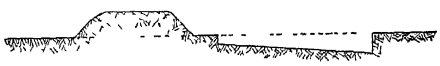


FIG 1 CROSS SECTION OF LYING-DOWN TRENCH

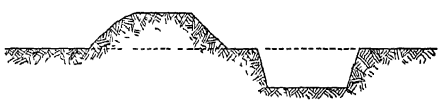


FIG 2 CROSS SECTION OF KNEELING TRENCH

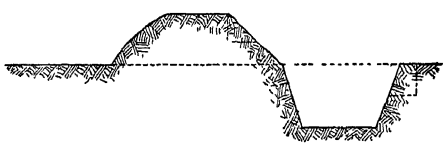


FIG 3 CROSS SECTION OF STANDING TRENCH

The opposing commander, if determined on a frontal attack, will probably make it at the earliest possible moment, in order that the defenders may have the minimum of advantage of protection from their defenses His command, too, will probably proceed similarly to strengthen certain portions of their own line, which must be held If successful in capturing any portion of the enemy's line, he may turn their intrenchments in order to prevent recapture To frustrate these efforts the defender, circumstances permitting, will so strengthen his trenches that the parapets shall be able to resist artillery fire. This requires a thickness in ordinary soil of 10 feet or more

The nomenclature of the various portions of the profile of such a work is indicated on the accompanying cut (Fig. 4) The superior slope will have an inclination forward of about 1 on 6 in order that the fire may sweep the ground in front The horizontal projection of the interior crest is called the *trace* and is generally used as a ground or fundamental line in laying off more deliberate fortifications If time allows, the interior slope of the parapet will be revetted with sod, fascines, hurdles, logs, sandbags, gabions, or other available material, and provision

will be made for drainage. Trenches will always be made as inconspicuous as possible. The illustrations (Figs. 5 and 6) show a front and rear view of a shelter trench where precautions have been taken to hide it from view in front. In the Cuban and Boer wars many trenches were made entirely in excavation and were practically invisible. The ground in front of the trenches within the most effective range of rifle fire should be cleared of everything which would hide an advancing enemy from view or afford him cover. Obstacles designed to hold an advancing enemy as long as possible under sustained fire will be placed in front of the intrenchments. The principal modern obstacles are wire entanglements (Fig. 7) and abatis (q.v.). There are also trous-de-loup, or shallow military pits, chevaux-de-frise, crow's-feet, and other similar obstructions. If time allows, a portion of the ground will be mined with charges of explosives (see MINES AND MINING, MILITARY), arranged to fire automatically upon the passage of troops over them. In some cases the site for the defensive line can be so chosen that the land in front shall be marshy or can be flooded by damming a small stream.

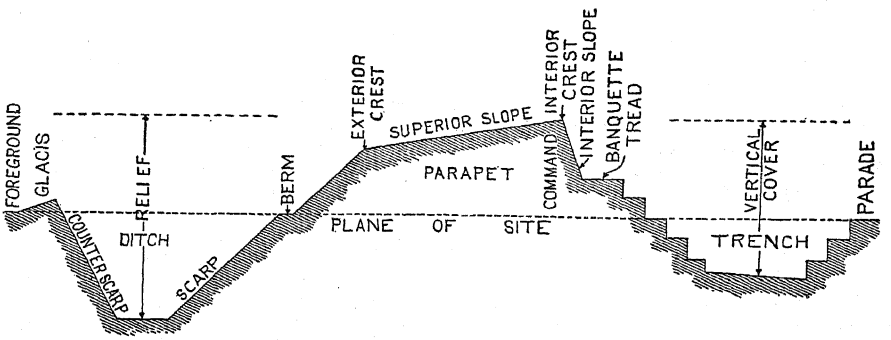


FIG. 4. PROFILE OF FORTIFICATION.

FIG. 5. SHELTER TRENCH — FRONT VIEW.

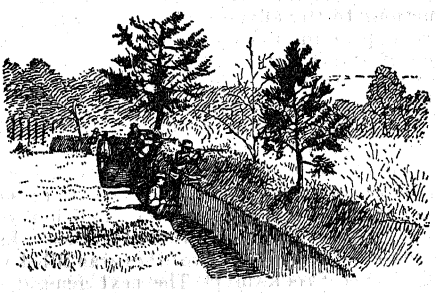


FIG. 6. SHELTER TRENCH — REAR VIEW.

There are usually along the line points naturally much stronger than others. Special pains will be taken to secure and strongly fortify these points by the construction of *redoubts* (q.v.), which are inclosed works, usually polygonal, square, or triangular in shape, provided with as many as possible of the structural advantages of regular fortification, and built on a scale commensurate with the strength and character of the force by which they are to be held. These are laid out on the ground in such a way as best to utilize the natural features in securing the maximum effectiveness of the redoubt at a minimum of labor of construction. As guides in making these constructions, light frameworks of wood, indicating the proper cross section, are made and placed in position at the angles of the work. In designing the *cross section* for a redoubt or intrenchment, it should be borne in mind that unless the excavation and embankment are equal in amount, earth may have to be carried some distance. In constructing such work it is usual to assign tasks to each man or squad. About six feet or two paces of crest should be apportioned to each man. After slight experience a man can, under stress, excavate about one cubic yard of ordinary earth in the first hour, provided the lift and throw are not excessive. The amount which he can be counted upon to do per hour diminishes considerably after the first few hours. *Traverses* (q.v.) should be built where necessary on the works to protect portions of the line which would otherwise be enfiladed by fire from a distance. As soon as possible bombproof shelters should be dug out or constructed, and also, if the works are to be held for many days, magazines for the ammunition. The weak points of a defensive line are the flanks. The opposing commander may therefore strive to capture the line by attacking it in flank, where

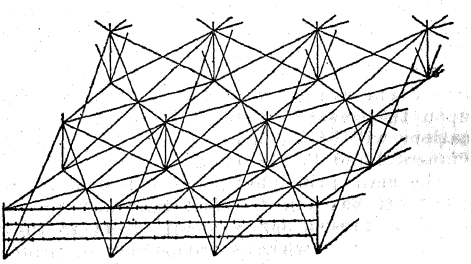


FIG. 7. WIRE ENTANGLEMENTS.

he can bring a heavy fire to bear, and will have to meet only a small fire It is therefore of great importance that the flanks should, if possible, rest on or near some natural obstacle, as a marsh or river, which will retard the movements of the enemy If this cannot be done, special provision will have to be made for strengthening and holding them

During the Mexican War (1846–47) and in more recent European wars, villages on the line were frequently placed in a state of defense This was practicable because of the general use of masonry buildings and walls

The artillery of the defense will be stationed in the intervals between redoubts behind epaulements, constructed by heaping earth in front of the guns, or in gun pits formed partially by embankments and partially by excavation

Provision must be made for a system of *roads* in rear of the line along which troops can be transferred from one portion of the line to the other, or by which supplies or reserves may be brought, or along which a defeated or demoralized portion of the army can retire to a position in the rear, where it may be reformed Bridges or other defiles in rear of the line which may serve as a line of retreat or supply should be well protected by blockhouses or *bridgeheads* at their ends, which will enable a small force to hold a large one in check while the army is passing

The fortifications just described are generally known as *field fortifications*, sometimes as hasty intrenchments Where they are more carefully constructed or improved, they become known as provisional, deliberate, or semipermanent fortifications The latter term is more particularly applied to the fortifications constructed around an important city or other area which it is thought may become an object of attack on the part of an enemy, and which it is desired to hold at all hazards They correspond to the permanent fortification applied in Europe to cities of similar importance, the main difference lying in the fact that the works are maintained in time of peace in the permanent system, while semipermanent works are allowed to fall into disuse upon the cessation of hostilities These fortifications will be found discussed later under Permanent Land Fortification

The main principle upon which field fortifications are based is the fact that men protected by them present but a small target to the fire of the enemy, whereas troops not so protected are exposed This becomes of great importance at the ranges at which modern battles are fought If held by a determined force they greatly increase the possibilities of the defense, and should the attacking force be defeated or become at all demoralized, would constitute a base from which the defenders could make a counterattack They were largely used in the American Civil and Franco-Prussian and subsequent wars, many instances occurring where a force with their assistance has held in check one many times larger than itself The general subject of field fortifications has been carefully treated in Fiebeger, *Text-Book on Field Fortifications* (New York, 1901), and *Engineer Field Manual* (Washington, 1907)

PERMANENT FORTIFICATION

Permanent defense or fortification is the art of strengthening in time of peace a position which it is feared may become the objective of an enemy in time of war Many of its principles are the same as those upon which field fortification is based The essential differences result from the fact that the latter depend on the movements of an army and are constructed as their necessity becomes apparent, whereas in the former an attempt is made to foresee and to fortify the objective in time of peace Such fortifications are constructed in advance because it is not believed that a defense commensurate with the importance of the interests at stake can be extemporized in time of war The same care is used in the design and construction as in such permanent works of civil engineering as bridges, railroads, and tunnels Especially must they be adapted to the probable form of attack and to the probable garrison available for serving them As the result of improvements in material and in methods of attack, permanent fortifications eventually become obsolete in certain respects unless ameliorated to keep pace with these improvements The essential principle to be kept in view is that the works should be ready to meet the attack when it comes

A country having no coast line is, of course, subject only to attacks by land One having a large seacoast rival and no military powers on its land frontiers is concerned primarily with seacoast defense The two fundamentally different methods of attack give rise to two general subdivisions of the subject, viz, Land Fortification and Seacoast Defense Most countries subject to both forms of attack require both methods of defense

PERMANENT LAND FORTIFICATION

Historical Development The art of fortification and the methods of attack which the fortifications have been constructed to resist or to supplement have developed together Each improvement in one has found its counterpart in the other. In different countries the development has not always proceeded in exactly the same way The constructions have been modified in accordance with the characteristics of the people and with the topographic features of the country Probably the first attempt at defense consisted in the erection of fences or palisades of wood, intended to serve as physical obstructions to the advance of the attacking force These appear in various shapes, sometimes being made of stakes driven into the ground and connected by wattling, sometimes by weaving together the branches of the natural growth of the woods, the entrance to the place being by tortuous and concealed routes These wooden obstructions, which were subject to attack by fire and by battering and cutting tools, were sometimes further fortified by the addition of a second, and even a third, row of stakes Later the space between these two lines was filled with earth (See STOCKADE) The next general step was the substitution of masonry for wood. These improvements were met by the attack with provisions for escalade The walls were then increased in height, and escalade became extremely difficult Battering implements were developed for the purpose of making breaches in the bottom of the wall These were met by placing earth in rear of the wall, bringing it up to within a few feet of the top, and furnishing a space for the movements of men at the top

who could, by throwing missiles from above, interfere with the ordinary operations of the besieger at the bottom of the wall

As the besieger became more pertinacious, this fire from above became of more importance, provision being made for extending platforms out, thus furnishing better positions from which missiles could be thrown down the face of the wall Still further to facilitate the defense from above, towers were constructed at intervals, from which it was easy to hurl missiles along the face of the wall These towers were sometimes made so that they could be isolated from the main portion of the wall and would not necessarily succumb to an enemy who had succeeded in reaching the top of the wall The besieger, to cope with these means of defense, utilized covered timber passages to protect himself from the missiles from above In this way he was enabled to reach and attack the wall with battering and other implements As these alone became insufficient to overcome the increased resistance of the walls of defense, the besieger constructed high wooden towers from which he, in his turn, could hurl projectiles at the defenders on the walls These towers were attacked by the defender with fire To prevent them from being burned, the besieger covered them with rawhide He also made use, either alone or in connection with these towers, of high banks of earth, which were gradually worked forward and higher To meet these methods and render them more difficult of success, the defense surrounded the walls with large ditches, making provision where practicable for filling them with water at will

The development of the various forms of bows and of catapults and other machines for throwing stones, etc, rendered the conflicts more severe and widened the area of contact between the defender and besieger (See ARTILLERY) Many of the walls constructed were most formidable in their proportions They included sometimes entire cities In other cases they were introduced as barriers to the approach of a large section of country, the greatest in length being the Great Wall of China In Germany development occurred along somewhat different lines More intricate protection was made in many places Houses were developed into castles, which were placed in naturally inaccessible positions They were gradually strengthened by many ingenious devices The house was surrounded by a ditch, the only method of crossing which was by a drawbridge raised and lowered at pleasure from the castle Devices such as machicoulis, loopholes, and embrasures were provided along the outer wall, from which the defender could attack the assailant while being himself fairly well covered The passage from the drawbridge to the interior could be barred by a portcullis, which was flanked by loopholed rooms The interior of the castle was provided with a high tower or keep, capable of defense after the outer walls had fallen

The foregoing represents, in general terms, the state of the art of fortification at the time of the invention of gunpowder. The general use of the latter caused many changes in the system of fortification, which gave rise, during the nineteenth century, to the development and modification of what is known as the bastion system of defense This system has exercised such a powerful influence on the development of fortification that a brief account of its history will be of interest The underlying principles of all fortification are unchangeable, but their application must, of necessity, be affected by every new invention of warfare, mechanical or strategical Consequently while the bastion system, as a system, is practically obsolete, its basic features still remain, although in a modified form and on a correspondingly larger scale

Much of the nomenclature of the art also had its origin in this system, although many of the terms are now applied to parts of forts which, in their present form, do not indicate the derivation of the word as originally applied Reference has been made to the placing of towers at intervals along walls for the purpose of flanking the latter These towers were either circular in plan or square, and were known as roundels The portion of the wall connecting them was called the curtain The introduction of artillery caused increased thickness and decreased height to be given to the walls, and the roundels were enlarged to permit the introduction of the large guns With artillery the besieged possessed an advantage in that they could reach the besieger at a greater distance and could destroy the various material objects the latter had heretofore used in approaching the walls The besiegers were obliged to discontinue their wooden constructions and substitute trenches of earth to protect them in their advances They also constructed breaching batteries at a distance off from the walls for the purpose of playing on the latter, breaking them down and making breaches through which an entrance could be made to the fort The approach was generally made towards a tower by zigzag trenches, but pointing, so far as possible, in such a direction as not to be subject to enfilade fire from any other part of the fort Advantage was also taken of the fact that in the use of the roundels there were small areas called angles of dead space in front of the towers which could not be well covered by the fire from the tower itself This led to an alteration of the plan to that of a pentagon, known as a *bastion* One side of the pentagon was placed along the line of the wall The angle farthest from the wall is known as the salient, the two sides adjacent to it as faces, the two sides connecting the faces with the wall as flanks

This combination of a number of bastions connected with each other by curtains, the whole forming an enceinte, is the basis of the *bastion system* The bastions were sometimes filled with earth to the grade where the guns were placed The top surface of this filling was known as the *terreplein* The length and direction of the faces, flanks, and curtain were such as to enable the ground in front of each portion to be flanked by the fire from some other part of the work In front of the terreplein there was placed a wall originally breast-high and designated as the *parapet* *Ramps* were inclined planes leading from the terreplein to the main level of the ground in rear, known as the parade The general mass of the enceinte was sometimes called the *rampart*, and was of such a height as to afford the required protection to the materials and people in rear On the outer side of the enceinte was the ditch The front wall of the enceinte was the *scarp* It was found that with this exposed to view the ditch could be reduced by the fire of artillery at a distance The outer portion—i.e, the counterscarp—therefore, was

raised to such a relative height that the masonry of the scarp could not be breached except by batteries coming to the crest of the counterscarp The ground in front of the counterscarp is the *glacis* A depressed road, known as the *covered way*, running around the work on the counterscarp, was added

As the weak points of the system were developed by attacks, efforts were made to strengthen them A crescent-shaped work known as the *demilune* was placed in front of the curtain, and the ditch and covered way were extended around in front of it To permit its faces better to be flanked, it was given the shape of a redan, and is now generally spoken of as the ravelin The *redan* (q v) in its simplest form is constructed of two parapets of earth, built so as to form a salient angle, having the apex pointing in the direction of the enemy It enabled the defense with its fire to enfilade and sometimes to take in reverse batteries which the besieger had succeeded in erecting on the counterscarp for the purpose of taking the adjacent bastions It left, however, the curtain scarp exposed to distant fire As a defense to this, a detached work, or *tenaille*, was constructed in the ditch in front of the curtain The gates of the work were usually placed in the middle of the curtain, openings being made through the tenaille for the defenders to reach and return from the ravelin The passageway through the ditch in front of the tenaille was sometimes protected with a small earthwork on either side As the height of the parapet above the terreplein gradually increased, becoming a breastheight wall in name only, there was added immediately in rear a small earthen platform known as a *banquette*, on which the infantry troops could stand in delivering their fire As a result of the increased power of guns, the length of each front increased As the fire became more accurate, greater attention was paid to bringing a cross fire on every portion of the work outside of the enceinte The bastions were enlarged at the expense of the curtains Provision was made for works inside the fort, which could be held after the fall of the bastion itself Those erected in the bastion proper were known as cavaliers The function of the covered way was enlarged The covered way itself was increased in size both at its salient and reentrance, the enlargements being known respectively as salient and reentrant *places of arms* These served as rallying points for large numbers of defenders, who rushed out in sorties at times when it was thought a counterattack would most embarrass the besieger

Palisades and other obstacles were introduced on the glacis It was seen that as the fronts were made smaller and increased in number, the general outline of the work approached more nearly to a circle, the adjacent fronts came nearer to being on the same straight line and capable of supporting each other better in resisting attacks More attention was given to the use of the most effective angles in the bastion and corresponding protection of the faces and flanks Casemates were constructed in the flanks of the bastions for the better flanking of the ditches To render it more difficult to enfilade the covered way, its crest was made *en crémaillere* Short traverses were in some cases added Redoubts were added in the ravelin The accompanying illustration indicates a typical arrangement of the bastion system towards the end of the eighteenth century (See Plate of FORTIFICATION, Figs 1, 1 a, and 1 b) The bastion system was used for many years, both for large and small works In some instances the wall around a whole city, such as that of Paris, consisted of a great number of bastion fronts, while in other cases many small forts, containing all the essentials for their own defense, were constructed An example of the latter is shown in the illustration of Fort Issy, one of the outer defenses of Paris

It is not practicable in an article of this length to cite the names of the various engineers who were prominent in the development of the features of the system It would, however, be incomplete without mentioning a few of the more celebrated Albert Durer, the famous painter, is credited with great improvement in the development of roundels It is not known who first suggested the change to bastions Daniel Speckles, an engineer in Strassburg in the sixteenth century, devoted much thought to the development of the system and enunciated many principles, the force of which was not fully recognized until a century or more after his death The system first became largely developed practically in Italy, and then throughout Europe, as a result of the fact that many Italian engineers were employed to develop the system of defenses in other countries As the system was adopted elsewhere, characteristic national changes were made in it In Spain the covered way, which is very essential where an active defense is desired, was little used and sometimes omitted Provisions for delaying the besieger by more gradual retirement were increased, while those for actively attacking him were diminished

In Holland the nature of the country led to the use of wide wet ditches. The lack of earth resulted in the use of lower parapets, the main one being sometimes supplemented by a lower one in front for the purpose of covering with its fire the wet ditch The works were frequently increased in number and made of more complicated plan, rendering an attack more difficult by an assailant unfamiliar with the ground One of Holland's most distinguished military engineers was Baron Coehoorn (q v) In France the art of fortification by the bastion system was reduced to precise rules The first French author of prominence was Bar-le-Duc, who lived in the latter part of the sixteenth century Marshal Vauban (q v), more generally known than any other engineer in any country as an exponent of the system, was a constructing engineer and a general rather than a writer He is said to have actually besieged over 50 forts, built 35 new ones, and improved some 300 old ones He also developed the use of ricochet fire and of parallels connecting at intervals the approaches for the attack of forts The approaches afforded additional opportunities for the establishment of breaching batteries Later came General Carmontaigne, who brought the bastion system to its most highly developed state

Soon afterward ideas made their appearance which have since resulted in the development of simpler but stronger fortifications Montalembert in France recognized the defects of the bastion system and took the position that a siege had become primarily an artillery contest He proposed a large use of casemates, which

should protect the guns from covered fire Instead of relying upon bastions in the salients for a flanking fire, he advocated the placing of low caponieres extending from the middle of each front into the ditch His ideas did not meet with favor in his own country for many years, but were utilized and developed in Germany into what became known as the *polygonal system* of defense In Sweden the habits and experience of the country led to the development of land fortifications similar to those of ships The Swedes placed their guns in casemated batteries in two or more tiers for their land fortifications, as well as for coast defense In Germany the bastion system had never met with great favor It is here that we find the first extensive use of the polygonal system The latter differs from the bastion system in the omission of the bastions and the prolongation of the main faces to the angles It has the advantage of saving the labor and ingenuity sometimes required to find suitable locations for the various sides of the bastions The main faces of the fort adapt themselves more readily to the site A ditch is provided in front of the enceinte, and a caponiere—i e, a casemated work—is pushed out from the middle of each face into the ditch, having a good flanking fire on the latter It, in its turn, is protected from a distant fire by its relative lowness as compared with the covered way, or with a ravelin or other outwork placed in front of it The system was used both for the construction of individual forts and of large enceintes surrounding great cities Perhaps the most advanced example of its use in the enceinte of a large city is in the one constructed on the north, east, and south sides of Antwerp, Belgium After the bastion and polygonal systems, what is known as the tenaille system was considered as the next most important type of construction It consisted of a succession of redans joined to each other, giving an alternation of salient and reentrant angles The main idea was that each face should flank the ground in front of the adjacent one While stoutly advocated on theoretic grounds, the system was never largely applied in practice

The many years of war at the beginning of the nineteenth century in Europe furnished a practical test of the fortification systems as they were in existence and developed their defects It was found that the inclosed enceintes were not large enough to hold a sufficient number of troops and supplies They were too close to the cities to protect the latter from bombardment as the range of the guns increased They exercised little influence outside of the reach of their own guns, as they did not contain room enough for a garrison larger than needed for their own service Unless a number of them surrounded the objective, the large armies simply ignored them by passing out of range of their guns in advancing on the main objective

The scope of the fortification was, therefore, enlarged by building, in advance of the main enceinte, small forts containing all the elements of defense A line of these forts located on the more critical points inclosed the ground necessary for the encampment of a large army

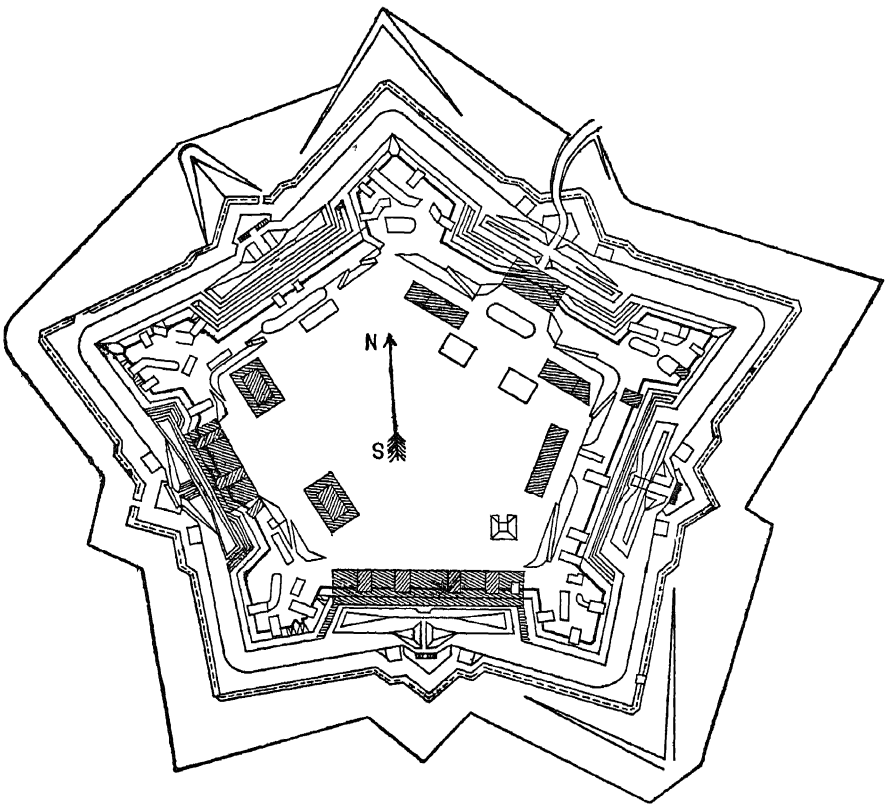


FIG 8 FORT ISSY — A DETACHED BASTIONED FORT

The new system was known as that of *intrenched camps* As greater use was made of curved fire, it became desirable to expose less and less masonry in the scarp walls of the individual forts In the development of the system of intrenched camps the different countries used different designs for the small forts As the range of the artillery guns increased, it became evident that the fate of the siege depended less and less on the small, carefully arranged niceties which had been of such value in earlier days The outer works became simpler and stronger As the range of the artillery was increased still further by the introduction of longer and more accurate guns, and of shells containing explosives, additional bombproof cover in which the defending troops could remain when off duty became more important It was becoming possible for the defender to compel the attacker to use his batteries at a range nearer to that of ordinary vision It was found that the high forts and traverses furnished him with an excellent target, and this led to attempts to render the forts more nearly invisible They were made lower and their outer appearance harmonized more closely with the general surface of the ground The fire of the guns was then found to attract the artillery fire of the attacker The guns were taken out of the forts or redoubts and placed in batteries in the intervals between the forts, every attempt being made to conceal their actual position from the attacker

The defense of Sebastopol in 1854 and 1855, the Civil War in the United States, and the Russo-Turkish War in 1877–78 showed the great value of works adapted to the site, simply and strongly built, with a view to meeting the latest phases of the attack

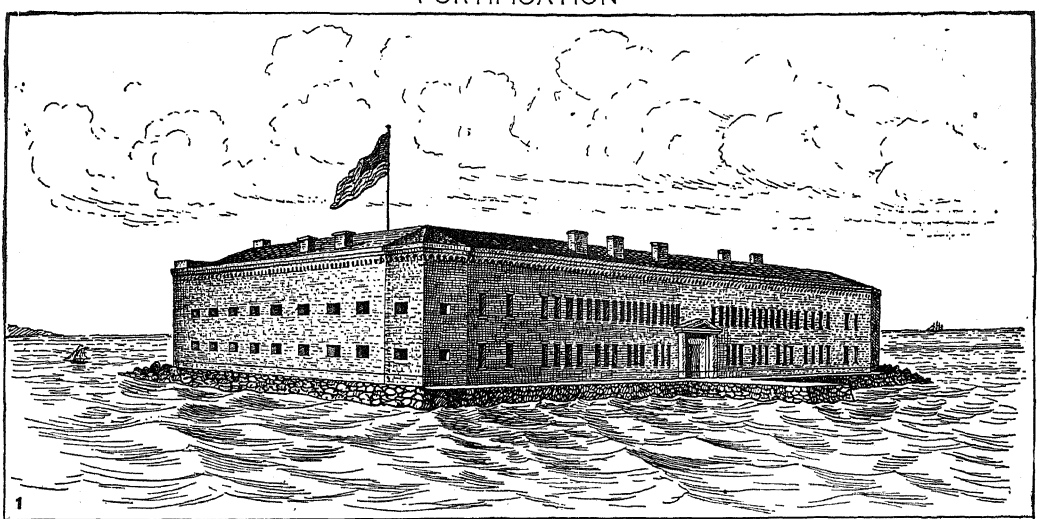
The more recent introduction of smokeless powder still further emphasized the advantage of invisibility in the works The redoubts have now become essentially a place for the development of infantry fire supplemented by machine guns, and in some cases small rapid-fire guns The use of the interior enceinte is becoming less general as the outer line of batteries becomes stronger

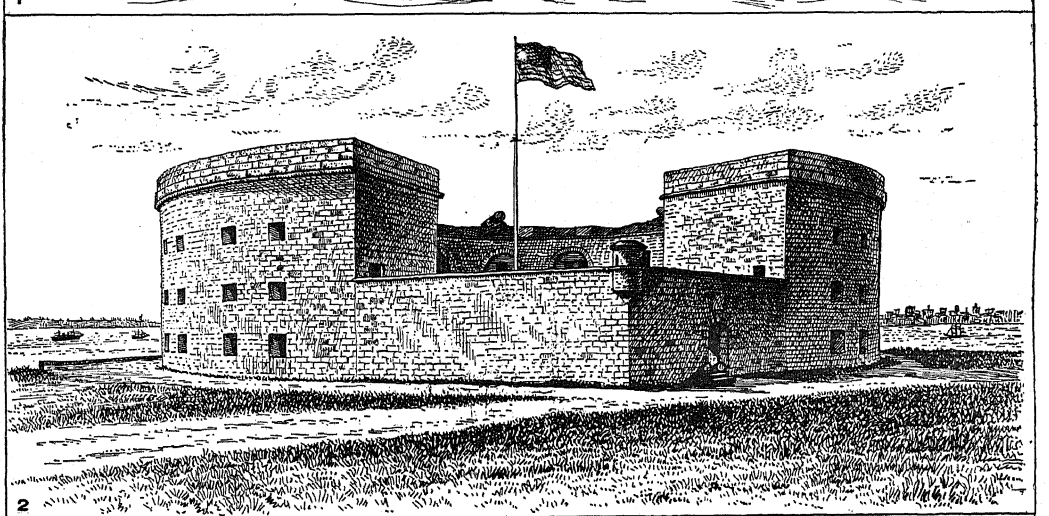
It is apparent that the art of fortification developed slowly but gradually and progressively for many centuries, but it has been within the last century and a half that radical changes have taken place New conditions are constantly arising, and it is impracticable to indicate what the art will be in another century Improvements have been made in recent years in range finders and in the methods of indirect fire control, enabling artillery to fire from hidden positions Doubtless it will soon be necessary to take into more serious consideration the use of air craft An interesting account of the development of the old-type fortifications is given in Viollet-le-Duc, *Histoire d'une forteresse* (Paris, 1873) A full account of the historical development of the various systems of fortification will be found in *Woolwich Text-Book of Fortification*, part ii (London, 1893)

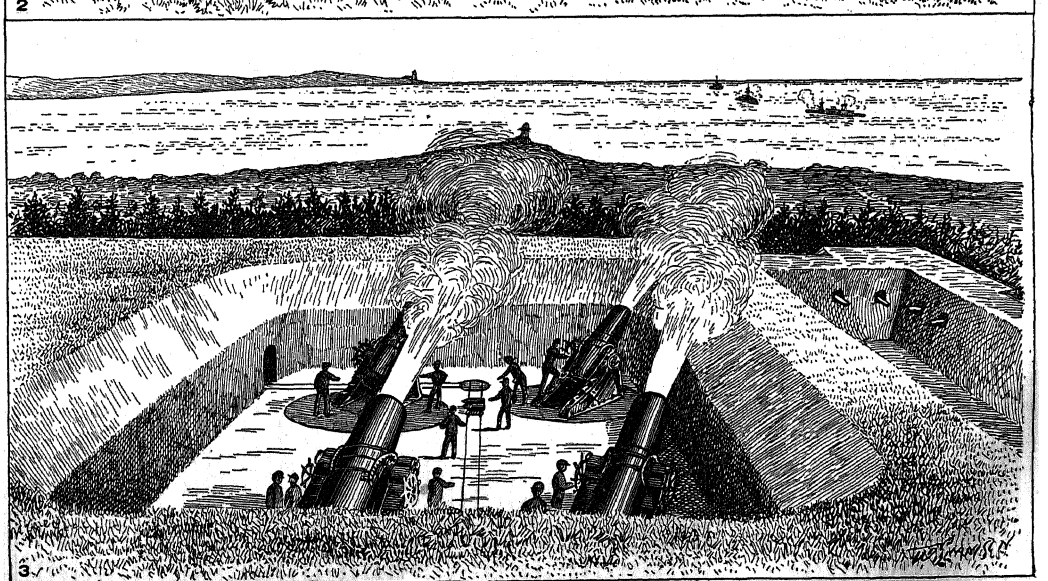
Modern Permanent Land Fortification The modern system of permanent land fortification consists of the use of forts d'arret and of intrenched camps The former are individual forts, complete in themselves, for small or medium-sized garrisons, and are placed for the protection of defiles, such as mountain passes, and of the frontier (See FRONTIER, MILITARY) The intrenched camp, which has taken the place of the old continuous enceinte as a fortification for cities and positions which it is desired to fortify in advance, consists primarily of an outer line of forts and batteries The distance of this line from the city to be defended varies greatly in different places Six thousand yards may be taken as a typical distance with modern artillery The main conditions to be fulfilled in determining the distance are that the works shall be so far to the front that the city cannot be bombarded from any position outside of them without coming under their fire, and that they shall be far enough out to provide sufficient room in their interior for the movements of the army to occupy the place The accidents of the ground generally control their exact position A work will be withdrawn or pushed out considerably, as the case may be, for the sake of securing a commanding position The forts or redoubts are now arranged essentially for a defense of infantry and machine-gun fire They are placed at such distance apart along the circle as to enable them to be mutually supporting Twenty-five hundred yards may be taken as a typical distance Batteries for guns and howitzers are established in suitable positions in the intervals between them The guns used rarely exceed 7 inches in calibre, howitzers of the same or slightly larger calibre are used The batteries must be so placed that the guns can bear directly on assaulting troops

There are differences in the practice and views of engineers in the various European countries as to the exact functions of the forts and batteries According to the practice of some, no guns larger than six-pounders are mounted in the forts An example of a typical fort on these lines is shown on the accompanying plate (Fig 3) Others provide for placing larger guns in the forts themselves The use of iron armor is advocated by some as protection for such guns Cupolas for 5 9-inch guns, 4 7-inch guns, and for 8 2-inch rifled mortars were established in the triangular forts built for the defenses of Bucharest It seems to be acknowledged generally that it is no longer desirable to maintain large guns behind ordinary parapets in the forts It has not yet been settled, by war experience, whether it is better to keep them in the fort in cupolas or to take them out, placing them in detached batteries, probably the consensus of opinion is in favor of the latter method The former certainly has the disadvantage that the besieger in attacking a fort attacks both the infantry and artillery of the defense In general, the individual forts are designed for a garrison of about one battalion of infantry, an example of a typical battery being shown herewith.

It is intended to construct an infantry parapet in time of war across the intervals between the forts and batteries, sometimes running in front of them Openings must of course be provided in this line to permit the egress of the troops making sorties Arrangements are made for clearing the ground for some distance in front of the forts and batteries, and for the necessary accessories of the defense, including such artificial means as towers or balloons, to assist in observing the enemy's movements, searchlights with which to illuminate his works at night; and for the running of telegraph lines, roads, and railroads In many cases it is the practice, instead of doing all these things in advance, to have projects prepared which include the most



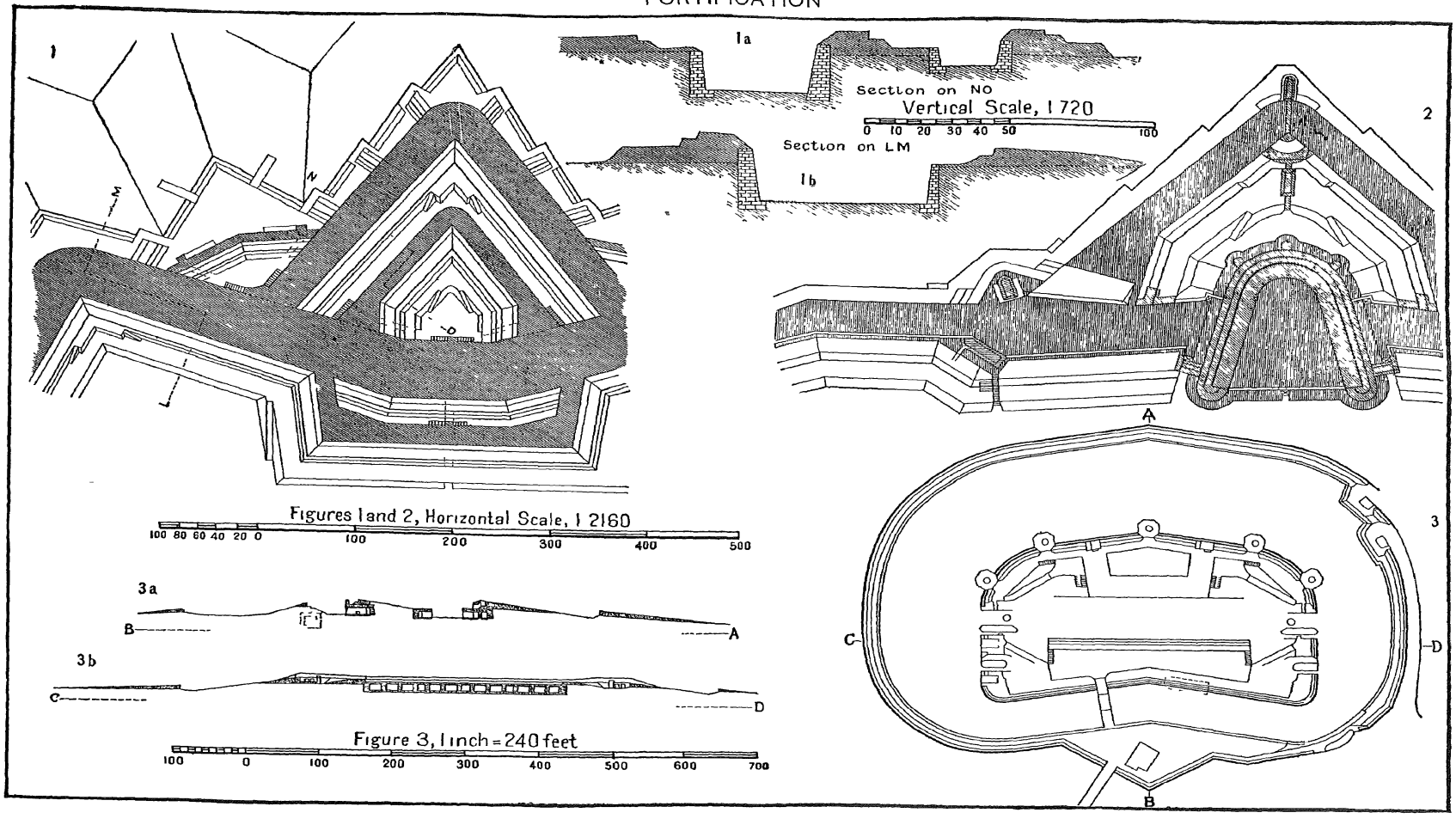




1. FORT SUMTER IN 1861.

2. CASTLE WILLIAM, GOVERNOR'S ISLAND. NEW YORK.

3. A MODERN UNITED STATES MORTAR BATTERY.



1. FRONT OF BASTIONED ENCEINTE; 1a and 1b Vertical Sections. 2. FRONT OF POLYGONAL ENCEINTE.
3. DETACHED POLYGONAL FORT 3a and 3b Sections through AB and CD.

up-to-date plans for them France, Germany, Russia, Austria, all have cities fortified on the above general lines In many cases, however, the cities were first fortified earlier, and the present fortifications are modifications of the old ones, conforming as near as may be to the modern ideas Most of the cities, in addition to being defended on the lines indicated, are provided with an interior enceinte, which is an additional security against surprise by any operation of the enemy's troops which may succeed in forcing the outer line Many engineers are of opinion that an interior enceinte is no longer necessary, that if anything be placed inside it should be simply in the nature of a palisade or similar work, to prevent surprise Still, the fact remains that most of the cities fortified as intrenched camps have also the enceinte

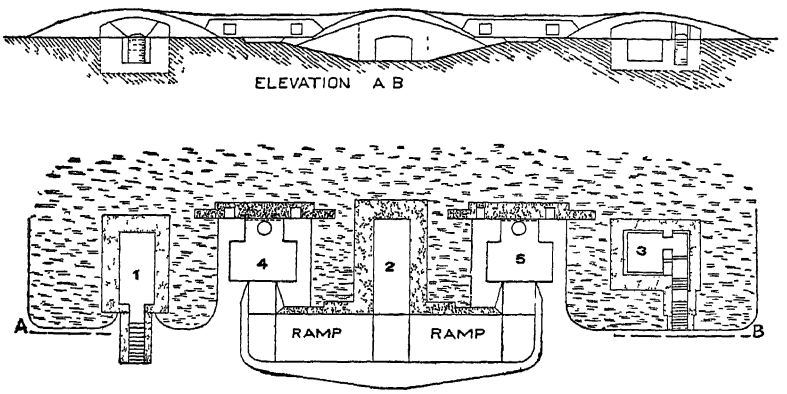


FIG 9 MODERN BATTERY
1 and 3, ammunition and stores, 4 and 5, guns, 2, shelter casemate

PROVISIONAL FORTIFICATION

Provisional fortification is the same in its function as permanent fortification It is sometimes known as semipermanent fortification, sometimes as deliberate fortification It is used either to complete a system of permanent works which are not complete when war breaks out, or to defend a totally new position that might have been provided with permanent works had it been known definitely that an attack was to be made. Probably the most notable and extensive use of provisional fortification was in the defenses of Washington during the Civil War The interior cities of the United States are not defended by permanent land works It is generally believed that they are not required for coping with any foreign foe likely to attack the United States During the Civil War, however, when the country divided into two parts, the two capitals being so close together as Washington and Richmond were, it became of the utmost importance that Washington should be provided with strong fortifications In general the forts were placed at intervals of about 1000 yards, and every prominent point was occupied by inclosed works, every important approach or depression of ground seen from the forts swept by field guns, and the whole connected by infantry trenches The works were gradually constructed as the war went on, were carefully executed, provided with timber magazines for the ammunition, and with the necessary traverses, bombproof shelters, and other essential features The success of the semipermanent works of the Civil War, those used by the Turks at Plevna, and of some other works constructed only shortly before hostilities has caused much attention to be paid to the value of this class of works

Blockhouses. In some countries—as, e g., in the case of the Spanish in Cuba during the last insurrection—many towns were surrounded by blockhouses placed in commanding positions and within short distances of each other immediately outside the cities and towns They were also used in connection with the construction of the famous Trocha and in the vicinity of many sugar mills and other valuable properties Much ingenuity was displayed in the construction of these houses, the system being developed probably more fully than ever before They were sometimes frame structures, sometimes masonry, sometimes of boiler iron, and consisted of either one or two stories Blockhouses are well adapted for use where the enemy from whom the attack is expected is not provided with artillery of sufficient power to demolish them They were largely used by the British in South Africa

Bibliography. For fuller details on the subject of permanent land fortifications, the reader should consult Mahan, *Permanent Fortifications*, revised by Mercur (New York, 1887), Woolwich, *Text-Book of Fortification and Military Engineering*, part ii (London, 1893), Lewis, *Permanent Fortification for English Engineers* (Chatham, 1890), Clarke, *Fortification* (London, 1907)

COAST DEFENSE

Coast defense, in its broadest sense, implies the defense of the coast against hostile attack This may be made against fortified places by a hostile naval fleet, alone or in conjunction with a landing force; or a landing may be attempted in an out-of-the-way place by a large army brought in transports convoyed by naval vessels The latter will probably not be attempted unless the fleet protecting the transports is stronger than any fleet by which it will probably be attacked Such an attack must be resisted by a stronger army on shore and becomes, therefore, largely a problem in land warfare Coast defense, which is discussed fully from the strategic and tactical point of view in another article (see COAST DEFENSE), as it is generally understood, has to do only with the resistance of attacks made by fleets It generally resolves itself into an attack upon a harbor This may be made for the purpose of securing control of the harbor as a base of operation and supply for the hostile fleet, or for the purpose of forbidding its use by the force of the country attacked, it may be to secure possession of naval docks, yards, and arsenals in the harbor, to prey upon commercial vessels, or to attack an inferior naval

fleet which has taken refuge therein The problem varies greatly, depending upon the population of the country, the occupations of its people, its resources, and the extent of its coast line France and Germany in the War of 1870–71 closed their ports for their own traffic as well as that of other countries and carried on their war entirely on land, neither being in a position to attack the other by sea England, being largely dependent upon other countries for her food supply, is therefore bound, for the preservation of her existence, to protect her commerce on the seas This policy imposes upon her the maintenance of an enormous navy, which was held for many years to be a sufficient protection against any attack that might be made on her shores She has also, however, adopted the policy of fortifying her principal harbors The problem for the United States is at the other extreme She has an enormous coast line and a relatively small navy It has been her policy to fortify her principal harbors, seacoast cities, railroad terminals, and navy yards, and to leave her navy as free as possible for offensive operation Guns afloat have an offensive advantage over guns ashore because of their mobility, but for defensive purposes the guns on shore have corresponding advantages over those afloat They are mounted much more economically, gun for gun, can be fired farther and more accurately, and cannot be tricked away from the place they are intended to defend Under modern methods of mounting they present an extremely small exposure to the enemy, whereas the entire ship of the enemy becomes their target

Historical Development At the outbreak of the Revolutionary War few ports in the United States had been provided with fortifications such as had been built were small and weak earth forts Throughout the early years of the war England's ships were comparatively free to come and go as they pleased, a notable exception being the instance of the repulse of the British fleet by a small fort on Sullivan's Island, Charleston harbor Between the Revolutionary War and the War of 1812 some attention was given to the necessity for fortifying the coast, and a few defensive works were built The best known of these to-day are Fort Jay (q v) and Castle William, on Governor's Island, New York harbor, which have endured to the present date, although now of little defensive value During the War of 1812 the English blockaded New York and Boston, but were not able to occupy them, but the damage and demoralization caused by their depredations in Long Island Sound and Chesapeake Bay, to which was added the damage wrought on the city of Washington, produced a deep impression on the public mind as to the necessity for a regular system of fortification Shortly after this war the general subject was carefully studied by the Board of Engineers of the Army, and work continued to be carried on under the comprehensive system which they inaugurated until the time of the Civil War Many of the principles which they formulated are still applicable, the general principles underlying their plans, as stated, being as follows:

"The means of defense for the seaboard of the United States, constituting a system, may be classed as follows First, a navy, second, fortifications, third, interior communications by land and water, and fourth, a regular army and well-organized militia. Fortifications must close all important harbors against an enemy and secure them to our military and commercial marine, second, must deprive an enemy of all strong positions where, protected by naval superiority, he might fix permanent quarters in our territory, maintain himself during the war, and keep the whole frontier in perpetual alarm, third, must cover the great cities from attack, fourth, must prevent as far as practicable the great avenues of interior navigation from being blockaded at their entrances to the ocean, fifth, must cover the coastwise and interior navigation by closing the harbors and the several inlets from the sea which intersect the lines of communication, and thereby further aid the navy in protecting the navigation of the country, and sixth, must protect the great naval establishments"

Reference has been made to Montalembert and his influence upon the art of fortification in Europe He had attracted particular attention to the utility of *casemates*, which were from that time forward freely used for many years in the flank defense of land fortifications They were also deemed particularly applicable to seacost works, and were used for this purpose in France, England, and Sweden The first prominent example of their use in the United States was in old Castle William, which stands as a type of the masonry seacoast fortress of the early part of the nineteenth century Where used for land fortification, the condition had been imposed that the masonry should not be exposed to the fire of guns, as its destruction was considered to be only a matter of time The conditions covering the naval attacks of the period in question were, in certain respects, different The ships were of wood and carried a large number of guns The general idea of fighting consisted in bringing as many guns as were needed on land into a comparatively small space where the channels were narrow. The attack, instead of being a matter of weeks, as in land fortifications, was expected to be a matter of hours The wooden sides of the ships were particularly vulnerable, and by putting the shore guns behind walls of stone they were in position to fire much longer than those on ships The casemate lent itself to this style of defense, in that by using it the guns could be placed tier on tier, and even at narrow and restricted sites many guns could be emplaced

The guns were usually mounted one to each casemate The scarp wall in front was given a thickness designed to resist the projectiles then in use on ships In the latter works this thickness was about 8 feet The walls were thoroughly braced by the sides and tops of the casemates Much study and attention was given to details, gradual improvements being made permitting a reduction in the size of the embrasures through which the guns were fired and an increase in their angle of fire The guns were arranged in the more recent works for a traverse of 30° each way, making a total of 60°, which led to the construction of works in the shape of a hexagon Guns on adjacent faces were enabled to fire parallel to each other when traversed to their extreme position, thus preventing the existence of a dead angle along the capital of the salients Some of the works were of brick, others of stone Most of them were provided with a land defense of some nature to assist the garrison in resisting an attack by a landing party Many of the works are well known, such as Fort

Warren in Boston harbor, Fort Wadsworth, New York harbor, Fort Sumter, Charleston, and Fort Monroe, Hampton Roads

About the time of the Civil War, however, there came radical changes in naval ordnance and attack Rifled guns were introduced and ships were covered with iron (See GUNS, NAVAL) The wonderful effect of rifled-gun fire on masonry was shown in the breaching of Fort Pulaski during the Civil War by the breaching batteries established on land by the Federals under General Gilmore As the war progressed, the Confederate engineers found it desirable to occupy some positions on the seacoast not already fortified This was done with provisional works of sand and timber The resistance made by a work of this character, Fort Fisher, near the mouth of the Cape Fear River, assisted in attracting attention to the value of sand as a defense Steam had by this time been generally introduced into navies, affording ships more latitude in taking up positions

These changes led to the introduction of armor in many cases for the protection of forts in Europe, it being argued that if good for the protection of ships' guns, it was good for the protection of forts, and that the latter could use as much of it as needed, whereas the ships were limited by the weight they could carry In the United States the value of sand as a protection was appreciated Immediately after the Civil War earthen batteries were built at important positions for mounting some of the smooth-bore guns then available About 1875, appropriations ceased and little work except of repair nature was done on the fortifications of the United States until 1890 By this time the rapid strides which had been made along the lines already indicated—i e, the introduction of steam into navies, the addition of improved varieties of armor, and the increase in accuracy and power of rifled guns—rendered the system of fortifications already built practically obsolete, except for certain minor purposes

Modern Coast Defenses The War Department having invited the attention of Congress to the condition of the national defenses and to the necessity for doing something to place them in better condition, an Act was passed in 1885 providing for the appointment of a board to examine and report at what ports fortifications or other defenses were most urgently required, the character and kind of defenses best adapted for each, with reference to armament and the utilization of torpedoes, mines, or other defensive appliances The report of this board, since known as the Endicott Board, which was submitted the following year, forms the basis of the present system of fortifications in the United States It recommended that defenses should be provided for the principal ports, which were arranged in the order of their relative urgency

The defenses as to character and kind, with reference to armament, should be fixed and floating, one or both, according to locality, and armed with powerful cannon needed to repel attack from the most formidable ships The shore batteries were to be armored turrets, revolving or fixed, armored casemates and emplacements in barbette Earthen parapets and traverses, sometimes arranged with core of concrete or rubble masonry to add resistance to shock, were to be used for barbette batteries

The Civil War had developed the value of the *submarine mine* as an element of defense The Endicott Board laid stress on this element as follows "It is not generally considered possible to bar the progress of an armored fleet by the mere fire of the battery, some obstruction sufficient to arrest the ships within effective range of the guns is necessary The kind of obstruction now relied upon is the torpedo in the form of a submarine mine and, except in special cases, exploded by electric currents, which are so managed that the operator on shore can either ignite the mine under the ship's bottom or allow the ship to explode it by contact In deep channels the submarine mines are buoyant, in comparatively shallow waters they are placed upon the bottom, the object in both cases being to touch or nearly approach the hull of the vessel Submarine mines are not accessories of the defense, but are essential features whenever they can be applied Bombproof operating rooms and tunnels for the conveyance into the water of the electric cables are necessary parts of the system, and must be constructed in advance of the occasion for their use Heavy batteries and submarine mines are correlative terms of a good defense from the shore Without powerful guns in the defense the armored ships of the enemy would proceed deliberately to the removal of the mines, either ignoring or silencing the fire of the works, and without the aid of the mines the enemy's vessels could not generally be prevented from running past the batteries"

Special batteries of guns were to be installed for the defense of the lines of mines against the attempt of unarmored or light-armored boats to countermine or grapple for their attachments When practicable, every mine field should be commanded by electric searchlights, so that the enemy's attempts at night to tamper with the mines may be detected and rendered abortive

The necessities of each harbor were studied in the light of the best information available, and the board made definite recommendations as to the number of guns and mortars, submarine mines, electric lights, and local floating defenses necessary for each harbor

The first fortification appropriation act designed to carry out the recommendations of the board was approved Sept 22, 1888, since which time appropriations of varying amounts have been made regularly each year for carrying forward the adopted scheme of coast defense—for the manufacture of modern seacoast ordnance, the construction of gun and mortar batteries, for torpedo defenses, and for the necessary accessories

The defensive details for each locality have since been elaborated in projects which have received the formal approval of the Secretary of War. These projects have from time to time been revised to keep pace with the changes in ordnance and ships' armament and construction At the time the scheme of coast defense was formulated by the Endicott Board, the rapid-fire gun was in its infancy and ships were characterized by their extremely heavy armament and great thickness of armor With the rapid development of this weapon and the increase in the resisting powers of armor by means of the Harvey and Krupp processes, there has followed a material change in ship construction, necessitating corresponding changes in the details of coast defenses In accordance with the recommendations of the Endicott Board, the earlier detailed projects contemplated mounting a considerable number of the heaviest guns at

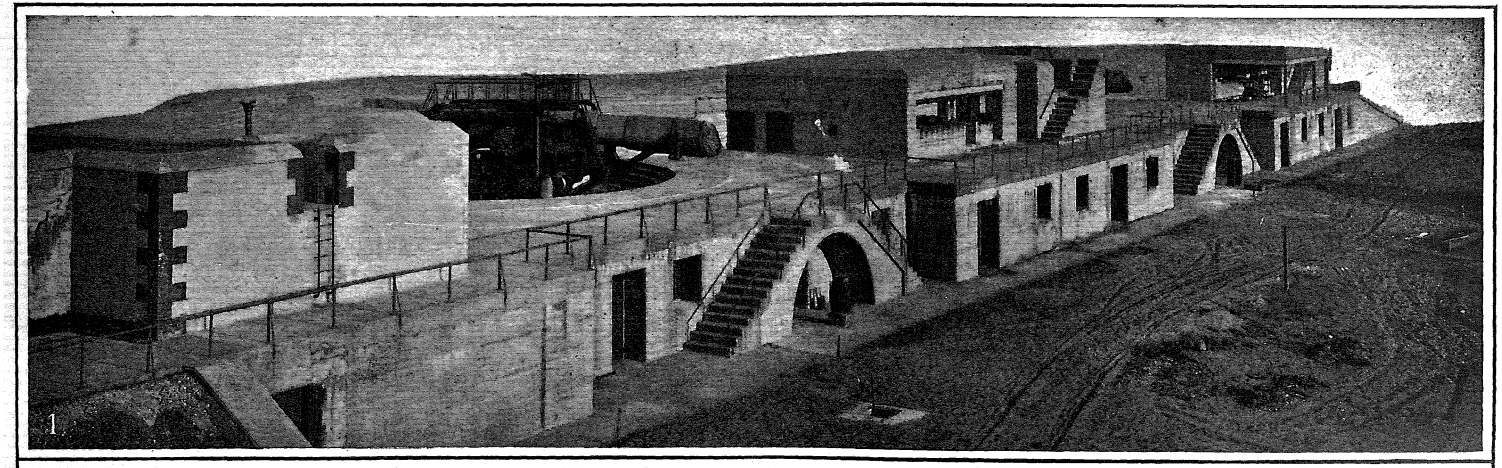
the more important harbors in armored works The tendency towards a reduction in calibres of heavy guns, coupled with the adoption of a disappearing carriage (see illustration under COAST ARTILLERY) for the large guns, has, up to the present time, rendered armored defenses generally unnecessary in the United States, although many European governments stand committed to the construction of armored casemates and turrets for their land defenses Rapid-fire guns were proposed in the earlier projects, but definite numbers or calibres were not assigned until 1896

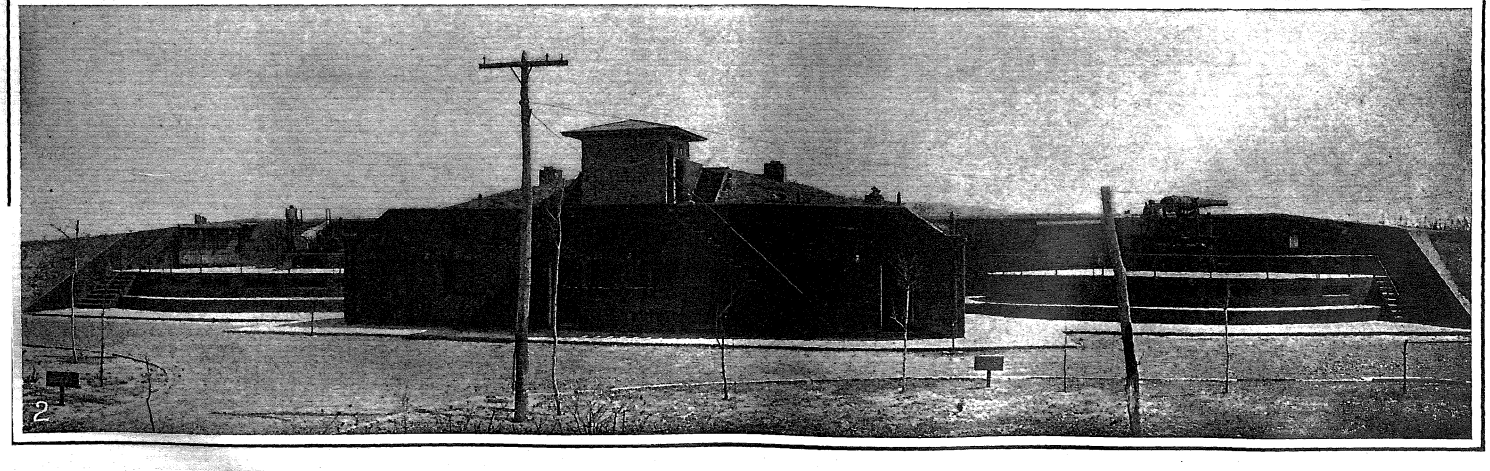
While the inauguration of the modern system of seacoast defenses for the United States dates from 1888, it was not until 1896 that Congress began making appropriations commensurate with the magnitude of the undertaking Stimulated by the larger appropriations and the war with Spain the seacoast defenses of the United States were, in 1906, about 67 per cent completed. Twenty-five of the principal harbors of the United States possessed a sufficient number of heavy guns and mortars mounted to permit of an effective defense against naval attack A considerable portion of the light rapid-fire emplacements and guns were completed, while a beginning had been made of inaugurating the systematic installation of fire-control systems and searchlight apparatus for night defenses Torpedo material necessary to enable a quick and effective defense to be made was in store at each harbor for which torpedo defenses were projected

Extensive torpedo experiments, resulting in the adoption of a new system, have been carried on at the School of Submarine Defense and elsewhere, and such experiments, as well as inventions or ideas submitted by individuals, are considered by the Torpedo Board

The growth of the country, the improvements in ordnance and in battleships, the development of the system of submarine mines, and matters of government policy led to the necessity for a revision of the Endicott scheme A new board known as the National Coast Defense Board was appointed by the President in 1905, and its report was made public in March, 1906 The board revised the list of places to be defended, reviewed the work already done, recommended the armament and accessories necessary to complete the defense, and furnished an estimate of the cost. Permanent seacoast defenses have been installed at the following localities in the United States Kennebec River, Me , Portland, Me , Portsmouth, N H , Boston, Mass , New Bedford, Mass , Narragansett Bay, R. I , eastern entrance to Long Island Sound, New York, N Y , Philadelphia, Pa , Baltimore, Md ; Washington, D. C , Hampton Roads, Va , Wilmington, N C , Charleston, S C , Port Royal, S C , Savannah, Ga , Key West, Fla ; Tampa Bay, Fla , Pensacola, Fla , Mobile, Ala , New Orleans, La , Galveston, Tex , San Diego, Cal , San Francisco, Cal , mouth of Columbia River, Oreg and Wash ; Puget Sound, Wash Fortifications have been and are being constructed at Guantánamo, Cuba, Honolulu and Pearl Harbor, Hawaii, Manila and Subic bays, Philippine Islands, and at Colón and Panama in the Canal Zone Additional defenses are to be constructed at some of these points and also at the entrance to Chesapeake Bay, Los Angeles, Cal , San Juan, Porto Rico, and Guam if funds are provided by Congress Some appropriations have also been made for modernizing the older emplacements in the United States

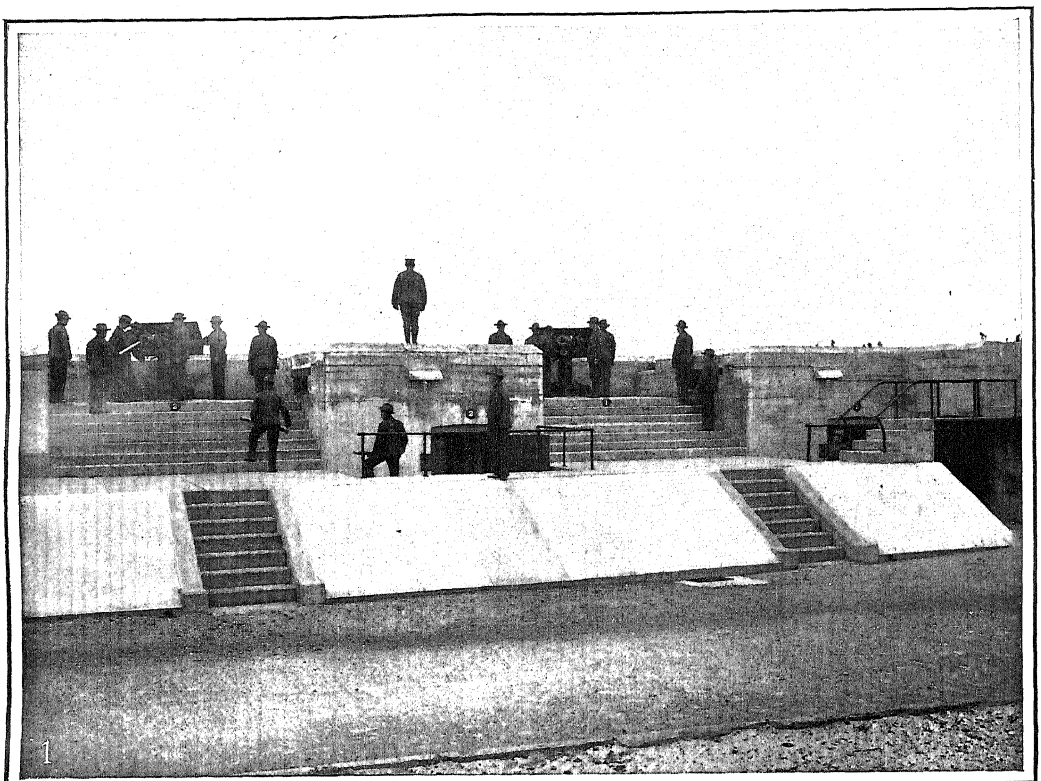
Features of Construction Large direct-firing guns are now usually mounted singly, with traverses between them to protect them from enfilade by distant hostile fire and to limit the destructive effects of projectiles landing in adjacent emplacements The distances between the guns vary with their size and with the nature of the ground Where possible, in the case of the larger guns, it is rarely less than 100 feet Mortars for indirect firing are mounted in pits The first requirement for the mounting of a modern gun is a proper foundation from which the gun may be fired and which will permit it to traverse freely and accurately While modern guns, as already indicated, have increased remarkably in power in recent years, the weight of the gun proper has not increased in the same ratio The usual precautions governing the design of foundations for heavy structures of course hold in the case of guns and mortars, in proportion to their weight The great increase in power of modern guns has, in addition, rendered corresponding precautions necessary to prevent the gun and carriage from being overturned by the recoil of the piece Provision is made for offsetting the strain transmitted to the foundation by the weight and distribution of the material of the latter In the case of some of the high-power English guns this has resulted in the construction of practically solid concrete bases 25 feet in diameter and 10 feet deep The traverse circle of the carriage is connected with this base by steel bolts two inches in diameter and extending nearly to the bottom of the base of concrete A loading platform of suitable dimensions on which the men can work while loading the gun is provided in the rear of the gun As modern ordnance is loaded at the breech the service of the gun is considerably expedited, and the cannoneers are enabled to work in more safety under the cover of the parapet The latter is a matter of considerable importance and is placed in front of the gun, connecting with the traverses on the side Where the gun is mounted on a disappearing carriage its muzzle projects over the parapet only in the firing position and recoils to a position in rear of the parapet for loading If mounted on a barbette carriage, the gun stands permanently with its muzzle projecting above the parapet (See illustrations in articles ORDNANCE and COAST ARTILLERY) The thickness which should be given the parapet is an open question among engineers The rule laid down by some of the best authorities is that it should be 50 per cent thicker than the greatest penetration of any projectile liable to strike it The modern method of constructing parapets is to make them of a mass of sand supported in rear by thick retaining walls of concrete immediately in front of the gun Projectiles striking in the front slope of a thick mass of sand thus backed will usually be deflected upward and pass out through the superior slope of the parapet, doing little damage to it, as the sand drops back approximately into place Lewis gives the thickness of the concrete retaining wall immediately in front of the gun for English emplacements for high-power guns at from 10 to 15 feet The superior or upper slope, both of concrete and earth, have a slight slope to the front The front slopes run off into the natural surface of the ground and in this and other ways

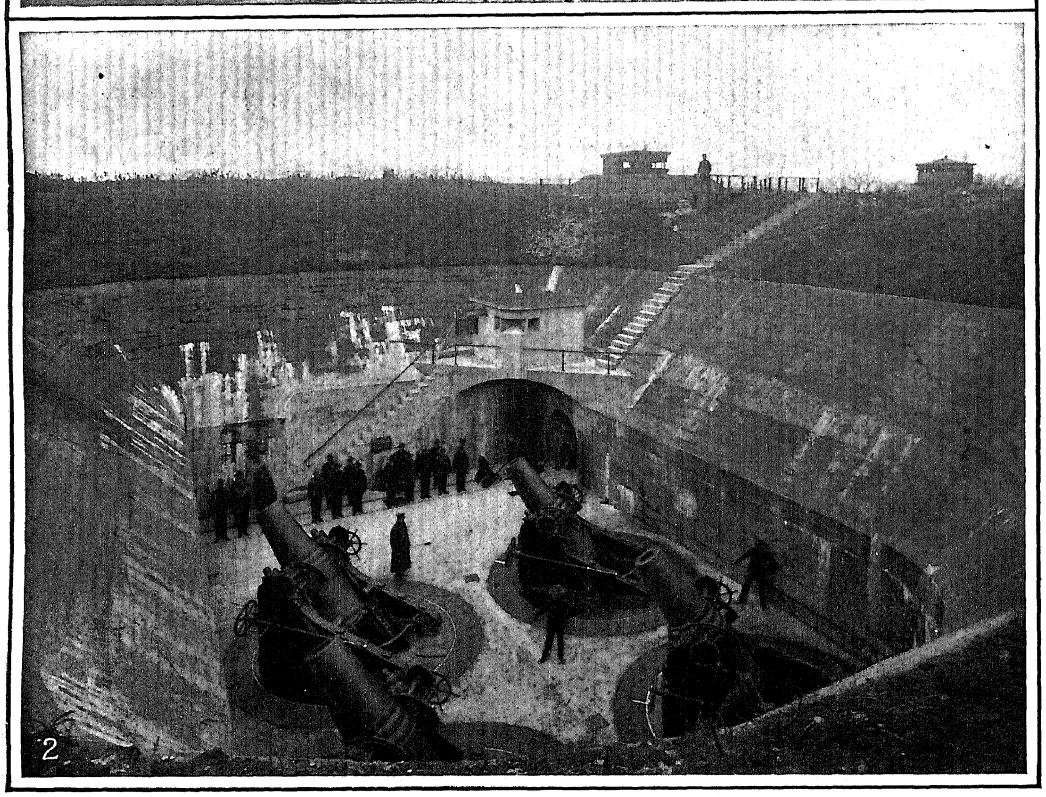




BATTERIES FOR UNITED STATES COAST DEFENSE

1. BATTERY OF 12-INCH GUNS MOUNTED ON DISAPPEARING CARRIAGES
2. BATTERY OF 6-INCH GUNS MOUNTED ON DISAPPEARING CARRIAGES Right gun in firing position, left gun in loading position





1. SEACOAST BATTERY OF 15-POUNDER RAPID-FIRE GUNS AT A UNITED STATES COAST DEFENSE FORT
2. SEACOAST BATTERY OF 12-INCH MORTARS. Mortars shown in firing position and range-finding stations in the background

the concealment of the battery is secured in order to make it a difficult target for the enemy on the water

The main magazine for a fort should consist of a building or buildings at suitable places convenient of access, in which powder in bulk, blank cartridges, shell, etc, may be stored The service magazine at the gun emplacement should have a capacity for the ammunition immediately needed At the time of the Civil War in the United States projectiles had not yet attained a weight too great to be handled by hand by two men Now the largest of them weigh half a ton, and special appliances in the way of trolleys and wheeled trucks must be provided for handling them expeditiously In view of the disastrous effects that may result from the explosion of a magazine, special precautions are taken to exclude hostile projectiles from it This is accomplished by placing it in a relatively lower position than the gun and giving its walls an ample thickness of masonry and earth covering Moisture is injurious to powder, and many precautions are taken to exclude dampness from the magazines In view of the fact that the service magazines are of necessity near the coast, and that the air around them frequently contains much moisture, the problem is a difficult one Careful attention is given to drainage, so that the surface water may be carried off as rapidly as possible Air spaces and French drains are provided to intercept water penetrating the mass of the cover The masonry walls are made as tight as possible and waterproofed By these means the infiltration of water is prevented Condensation will, however, occur when damp air is admitted to the magazine and strikes the walls and material at a temperature below its dew point The prevention of condensation is a problem of relative heat and cold, and is usually met by attempts at careful regulation of the ventilation, admitting air so far as possible only at times when it is the driest The walls are also sometimes lined with brick, with a view to absorbing water which may be deposited on them if the magazines must be opened for a short time at unfavorable periods.

In a modern fortification there are many elements to be considered Living rooms for the cannoneers are built in the emplacements Provision must be made for lighting the emplacements, magazines, etc, in case of action at night This was formerly done by means of lamps, but recently in the United States electric light and power have been furnished in seacoast batteries Lookouts for the observation of gunfire must be built and the latest appliances for accurate fire control must be installed Stairs and ramps are provided where necessary in the emplacement for free and easy communication between its various parts

In the United States the regulations concerning the promulgation of information relative to the permanent works of defense are quite explicit and forbid the publication of many interesting and significant facts concerning the more modern fortifications For descriptions of these fortifications, the reports of the Chief of Engineers of the army, including the reports of the district constructing officers, and the Drill Regulations for Coast Artillery should be consulted. For works of reference, aside from these official sources, consult: Abbot, *Defense of the Seacoast of the United States* (New York, 1888), Clarke, *Fortification* (London, 1907), Schwartz, *The Influence of the Siege of Port Arthur upon the Construction of Modern Fortresses* (Washington, 1908), Harvey, *The Castles and Walled Towns of England* (London, 1911), Thompson, *Military Architecture in England during the Middle Ages* (Oxford, 1912), Chatham manuals and the various service magazines The use and disposition of troops is discussed under TACTICS, MILITARY, the methods of coast defense are treated under that title, while the various weapons used are described in such articles as ARTILLERY, ORDNANCE, TORPEDOES, COAST ARTILLERY, FIELD ARTILLERY, GUNS, NAVAL, HORSE ARTILLERY, RAPID-FIRE GUNS, ARMOR PLATE, PROJECTILES, COAST DEFENSE

FORTIFICATIONS, ATTACK AND DEFENSE OF The construction and nature of fortifications have been considered under FORTIFICATION, the present article will mention the tactics involved in their attack and defense Many details of the subject are more appropriately treated under SIEGE AND SIEGE WORKS, but in some respects the tactics of field artillery (see TACTICS, MILITARY), with certain modifications, find application The attack of a fortification is a planned attack on a prepared position, but the field material is supplemented by siege artillery and engineer work The attack and defense proceed in many respects as in the attack of one army by another in the field

The cavalry first incloses the fortification and remains in observation, the infantry then occupies its position deliberately, directing its forces against at least two of the fronts of the fortification, in order to deceive the enemy, preparing against surprise by means of very strong outposts, especially on the front, selected for actual attack, and the latter must generally intrench themselves, the siege guns are placed in position under its protection, the guns of the defender are if possible silenced, and the nearer means of defense are destroyed The infantry can only advance under cover, consequently the outposts are first advanced and then their previous position is improved during the night to serve as an infantry position by constructing groups of fortifications previously laid out by the engineer officers Where the infantry cannot be brought forward under natural cover, zigzag approaches must be run If the infantry position is too far to the rear for the final assault, another and often a third position must be prepared farther to the front If the heavy artillery fails to destroy the enemy's works flanking the ditch, the attacker will be forced to begin the tedious engineer attack by the sap Otherwise the assault is ordered, and is preferably begun in the early morning, and the attack is directed on a broad front Several false attacks are made at the same time, to deceive the enemy if possible Meanwhile the infantry moves gradually forward, and if successful finally takes the position by storm The work is carried on with energy, to prevent the enemy from having any rest in his work.

The same principles apply in the defense, activity and the offensive being predominant In the early stages the infantry must go out in the open and may so cripple the attackers as to cause them to abandon the assault. If, however, the attack is successfully conducted, the defense becomes purely passive in the later stages If the

attack of a fortification advances to the siege stage, it is evident, from the fact that they were unable to maintain a sufficient army in the field to drive back the invaders, that the defenders are usually at a disadvantage The command of the fortified place under such circumstances usually involves many problems of government, including the food supply of the civilian inhabitants, as well as the proper command of troops It plainly requires a man of ability and resourcefulness who must withal be possessed of a stout heart and great wisdom If he cannot hold the place until relieved or until the close of the war comes, as the result of operations elsewhere, history shows that he may be subjected to a most critical judgment by his countrymen See SIEGE AND SIEGE WORKS, MINES AND MINING

FORT IN'DEPEN'DENCE A fortification on Castle Island, Boston harbor, Mass., built on the site of the former Castle William

FORTIS, fôr'tês, ALESSANDRO (1841–1909). An Italian statesman, born at Forlì He studied law at Pisa and in 1867 fought under Garibaldi at Mentana He became a radical leader, was arrested with Saffi and others during the elections of 1874, was elected to the Chamber of Deputies from Bologna in 1880, acted at first with the radical Republicans but in 1888 joined the dynastic party, and till 1890 was Undersecretary in the Ministry of the Interior In 1898–99 he held the portfolio of Agriculture and Commerce in the Pelloux cabinet He was Prime Minister and Minister of Interior from March, 1905, to February, 1906, his cabinet carrying through the purchase of railways

FORTIS, fôr'tês, GIOVANNI BATTISTA, or ALBERTO (1741–1803) An Italian traveler and naturalist, born in Padua He became an Augustinian monk, but spent his time in travel. His publications include *Saggio d'osservazioni sopra l'isole di Cherso ed Osero* (1771), *Viaggio in Dalmazia* (1774, Eng trans, 1778), his best-known work, containing an interesting collection of the folk songs of the Serbs and Croats, *Della valle vulcanico-marina di Roma* (1778), *Versi d'amore e d'amicizia* (1783), *Mémoires pour servir à l'histoire naturelle et principalement à l'oryctographie de l'Italie, etc.* (2 vols, 1802)

FORT JACK'SON. A fort on the right bank of the Mississippi, 78 miles below New Orleans, famous for its resistance to Farragut's fleet and its final capture by the Federals in 1862. It was built in 1824–32 and was enlarged and repaired in 1841 After the passage of the South Carolina ordinance of secession, on Dec. 20, 1860, the State authorities of Louisiana seized these forts, strongly fortified them, and stationed a fleet above In the spring of 1862 a Federal expedition was organized against New Orleans, and the Confederates, soon hearing of it, greatly strengthened the two forts The expedition, under the command of Captain Farragut, arrived at the mouth of the Mississippi in March, and on April 18 the powerful mortar flotilla under Commander D. D Porter opened fire with terrible effect upon the forts At 2 AM on the 24th Farragut's fleet started in single line up the river, and in the face of a tremendous fire from the two forts and from a Confederate fleet succeeded in passing first Fort Jackson and then Fort St Philip Soon afterward the city was occupied by Federal troops, and on the 28th both Fort Jackson and Fort St Philip capitulated to Commander Porter, who had remained below The two forts were under the command of Brig-Gen J K Duncan and were garrisoned by about 700 men each Fort Jackson was under the immediate command of Lieut-Col Edward Higgins The loss of the Federals was 37 killed and 147 wounded, while that of the Confederates is not definitely known Consult Johnson and Buel, *Battles and Leaders of the Civil War,* vol ii (New York, 1887), Mahan, *Admiral Farragut* (ib, 1892), Nicolay and Hay, *Abraham Lincoln A History,* vol v (ib, 1890)

FORT JAY. A United States military post, established in 1806 on Governor's Island, New York The island, whose area recently has been increased by refilling the shallow water near its shores, contains the fort proper, garrisoned usually by a battalion of infantry, Castle William (military prison), and the headquarters of the Eastern Department of the First Division, and of the Military Service Institution of the United States Governor's Island was first occupied by the Dutch, who called it Nutten Island, afterward, under the English rule, it was a perquisite of the royal governors, from which fact it derived its name In 1710 it became a quarantine station In 1775 the island was first fortified and occupied successively by the American and the British troops From 1784 to 1794 it was used as a summer resort and racecourse In 1800 the island was deeded to the United States by the Legislature, and in 1806 a permanent fortification was built upon the site of the original Fort Jay, an early earthwork. In 1812 the "South Battery" was added to the defenses Extensive improvements were begun in 1901, which have comprised increasing the area of the island to about 103½ acres, the erection of new docks, numerous warehouses, additional barracks, and officers' quarters for the accommodation of a regiment of infantry For illustration of Castle William, see FORTIFICATION

FORT KENT. A village in Aroostook Co, Me, 200 miles north of Bangor, on the Bangor and Aroostook Railroad and on the Fish River (Map Maine, D 1) It contains the St Louis Convent, the Madawaska Training School, and several relics of the Aroostook War Lumbering is the chief industry. Pop, 1900, 2528, 1910, 3710

FORT KEOGH, kē'ô A former United States military post in Montana, established in 1876 and comprising a reservation of 57,600 acres It was named for Capt. Myles Keogh, Seventh United States Cavalry, one of the victims of the Custer massacre

FORT LAFAYETTE, la'fâ-ĕt' A fort on the Long Island shore of the Narrows, New York harbor, in front of Fort Hamilton

FORTLAGE, fôrt'la'ge, KARL (1806–81) A German philosopher He was born at Osnabruck and was educated at Gottingen, Berlin, and Munich He became a lecturer at Heidelberg in 1829 and later at Berlin, and in 1846 he accepted the professorship of philosophy at Jena. In his later writings he made psychology the basis of philosophy, thus following the teachings of Beneke and Fichte His works include *Darstellung und Kritik der Beweise fur Dasein Gottes* (1840), *Genetische Geschichte der Philosophie seit Kant* (1852), *System der Psychologie als empirische Wissenschaft aus der Beobachtung des innern Sinnes* (2 vols, 1855), *Beitrage zur Psychologie als Wissenschaft aus*

Spekulation und Erfahrung (1875) Consult Brasch, in *Unsere Zeit* (Leipzig, 1883)

FORT LAWTON A United States military post, located 6 miles from Seattle, Wash, and 2 miles from the railway station at Interbay It was established in 1899 and in 1914 was garrisoned by a battalion of infantry besides being the headquarters of a regiment

FORT LEAV'ENWORTH A United States military post in Kansas, established in 1827 by Colonel Leavenworth, U S A, as an outpost to protect the Santa Fe trail against Indians The reservation is on the west side of the Missouri River and about 500 miles above the junction of the Missouri with the Mississippi, on the Kansas City, Wyandotte, and Northwestern and Missouri Pacific railroads The station of the army-service schools, the United States Military Prison, and a large garrison usually comprising all arms of the service, are located at the post, which has both post office and telegraph station A battalion of engineers is usually stationed here and a part of the military bridge equipage of the army

FORT LEE A borough in Bergen Co, N J, 15 miles north of Jersey City and opposite New York City, with which it is connected by ferry (Map New Jersey, E 2) It is situated on the Palisades and contains the Institute of the Holy Angels The chief industries are the manufacture of piano actions and motion-picture films Pop, 1910, 4472 In Revolutionary times it was one of the forts that defended the Hudson On Nov 20, 1776, General Greene with 2000 men narrowly escaped capture by a force of 5000 British under Cornwallis He retreated with Washington across New Jersey, leaving many stores behind

FORT LIS'CUM A garrisoned post of two companies, situated on the northeast shore of Prince William Sound, 3 miles from Valdez, Alaska (Map Alaska, K 5)

FORT LO'GAN A United States military post, established in 1889 and comprising a reservation of 640 acres, 3 miles from Denver, Colo In 1914 it was a recruit depot

FORT McAL'LISTER. A strong earthwork, erected by the Confederates during the Civil War on Genesis Point, on the right bank of the Great Ogeechee River, 6 miles from Ossabaw Sound and 12 miles south of Savannah, Ga Early in 1863 Admiral Du Pont, wishing to give the recently constructed monitors a preliminary trial before using them against Fort Sumter (q v), ordered the *Montauk* (Commander J L Worden), assisted by the gunboats *Seneca*, *Wissahickon*, *Dawn*, and *Williams*, to attack Fort McAllister Bombardments occurred, without serious damage either to the fleet or the fort, on January 27 and February 28, the Confederate privateer *Nashville*, which had grounded near the fort, being destroyed on the latter day On March 30 an eight hour attack, with little effect, was made by the monitors *Passaic*, *Patapsco*, and *Nahant*, under Commander Drayton Finally, on Dec 13, 1864, the fort was assaulted and captured by General Hazen's division of General Sherman's army The Union loss was 24 killed and 110 wounded, the Confederates losing about 50 killed and wounded This was the concluding operation of Sherman's march to the sea and led to the surrender of Savannah several days later Consult Ammen, *The Atlantic Coast* (New York, 1883), Johnson and Buel, *Battles and Leaders of the Civil War*, vol iv (ib, 1887), Sherman, *Memoirs*, vol ii (ib, 1875)

FORT McDOW'ELL A United States military post located on Angel Island in the harbor of San Francisco, Cal In 1914 it was a recruit depot

FORT McHEN'RY A former United States military post, established in 1794 It occupied a reservation of 35 acres on Whetstone Point, Patapsco River, Md, 3 miles distant from Baltimore, Md Its site was first occupied for military purposes in 1775 In 1794 it was established as a permanent fortification and was named after James McHenry, one of Washington's private secretaries during the Revolution, and Secretary of War, 1798 In September, 1814, it successfully withstood a bombardment by the British fleet under Admiral Cockburn It was this attack which suggested to Francis S Key his famous ode, "The Star Spangled Banner" During the Civil War the fort was used as a rendezvous and military prison In 1906 there was an artillery garrison of one company, but, with the redistribution of coast artillery, it later was abandoned as a military post

FORT McINTOSH A United States military post in Texas, on the Mexican frontier, 1 mile distant from the city of Laredo which is the post office, telegraph office, and railway station It was garrisoned by a squadron of cavalry in 1914, while a regiment of infantry was stationed at Laredo

FORT McKIN'LEY A United States military post on Great Diamond Island, in the harbor of Portland, Me, of which it is an important element of the defense, garrisoned in 1914 by seven companies of coast artillery

FORT MA'CON A fort commanding Beaufort harbor, N C, taken by Federal land and naval forces on April 26, 1862

FORT McPHER'SON A United States military post, located 4 miles south of Atlanta, Ga, and garrisoned by a regiment of infantry

FORT MAD'ISON A city and the county seat of Lee Co, Iowa, 18 miles (direct) southwest of Burlington, on the Mississippi River, and on the Atchison, Topeka, and Santa Fe and the Chicago, Burlington, and Quincy railroads (Map Iowa, F 4) It is the seat of the State penitentiary and has the Cattermole Memorial Library, the Santa Fe and Sacred Heart hospitals, and several public parks A fine railroad and wagon bridge crosses the river at this point There are a pork-packing house, shops of the Atchison, Topeka, and Santa Fe Railroad, grain elevators, brickworks, cement-block works, foundries and machine shops, flour and saw mills, farm-implement works, wrapping-paper mills, heater works, and manufactures of overgaiters, buttons, boots, and shoes, furniture, canned goods, fountain pens, boxes, tools, etc Fort Madison was settled in 1832, on the site of a fort dating from 1805, which was destroyed by fire in 1813, the town was incorporated in 1836 The government is administered by a mayor and a unicameral council Pop, 1900, 9278; 1910, 8900, 1920, 12,066

FORT MEADE A United States military post, on a reservation of 7842 acres, at Sturgis, S D, on the Fremont, Elkhorn, and Missouri Valley Railroad It was established in 1878 to protect settlers against Indian attacks It was improved and modernized in 1902 and in 1914 was garrisoned by a regiment of cavalry

FORT MEIGS, mēgz A former fort at the

Maumee Rapids, in northwestern Ohio, famous for its defense by the Americans against the English and Indians during the War of 1812 It was built in February, 1813, by General Harrison, who had established his advanced post here after the "Massacre of the River Raisin" (see FRENCHTOWN), and about May 1, 1813, the British General Proctor, at the head of more than 2200 men (including about 1500 Indians under Tecumseh), began an attack, which lasted, with little intermission, until the 5th On this day an American reinforcement of about 1100 men, under Gen Green Clay, arrived, and a battle, or series of battles, ensued without decisive result Proctor, however, seeing the hopelessness of further attack and being considerably weakened by Indian defections, withdrew from the vicinity of the fort on the 9th Being ordered to take his supplies from the country, he returned again on July 20, but the restlessness of his Indians forced him to give up the attack and march on to the upper Sandusky Consult Dawson, *Battles of the United States* (New York, 1858), Lossing, *Pictorial Field Book of the War of 1812* (ib, 1869), Slocum, *The Ohio Country between the years 1783–1815* (ib, 1910)

FORT MER'CER An abandoned fort at Red Bank, N J, on the Delaware River, which during the Revolutionary War formed one of the defenses of the city of Philadelphia Immediately after occupying Philadelphia, in 1777, Sir William Howe (q v) perceived the necessity of securing Forts Mercer and Mifflin, in order to open communication by water with New York and thus prevent the forcing of his army into a state of siege Late in October, accordingly, a force of about 2500 picked men, mostly Hessians, under Colonel Donop, was sent against Fort Mercer, and a supporting fleet was ordered up the river. On the 22d the Hessians attacked with vigor, but were fiercely beaten back by the small American garrison, numbering 300, under Col Christopher Greene, and were finally forced to withdraw After the capture of Fort Mifflin (q v) Fort Mercer was abandoned (November 20) by the Americans and soon afterward was destroyed by the British Consult Dawson, *Battles of the United States* (New York, 1858), and Lowell, *The Hessians in the Revolution* (ib, 1884)

FORT MIFF'LIN A fort on Mud Island, in the Delaware River, near the mouth of the Schuylkill River It is one of the defenses of the city of Philadelphia and in American history is well known for its siege and capture by the British during the Revolutionary War Together with Fort Mercer (q v), on the New Jersey shore, it controlled the approach by water to Philadelphia, and when that city was captured by Sir William Howe, in 1777, shut the British off from communication with their fleet and obstructed the passage of supplies On October 23 it was bombarded for several hours, but with little effect, by a British fleet, assisted by a land battery, an American fleet (called the Pennsylvania Navy), under Col John Hazelwood, cooperating with the fort, which was then garrisoned by only 300 men, under Col Samuel Smith Finally, the British erected a strong battery on Province Island and greatly reinforced their fleet On the 10th of November they again attacked and after an almost constant bombardment for six days the Americans evacuated the fort and crossed over to Fort Mercer The British loss was 13 killed and 24 wounded, the Americans lost more than 10 times that number An extended account of Fort Mifflin during the Revolution is given in Wallace, *An Old Philadelphian, Colonel William Bradford* (Philadelphia, 1884) Consult also Dawson, *Battles of the United States* (New York, 1858)

FORT MIMS, mimz, MASSACRE OF An Indian massacre on Aug 30, 1813, during the Creek War, at Fort Mims, a temporary stockade 35 miles north of Mobile, Ala On the outbreak of the war 553 men, women, and children had assembled here for protection, under the command of Dixon Bailey, but, although Bailey had been warned, they were surprised by a greatly superior force of Indians, under the half-breed Weathersford, at noon on August 30, and, though they offered brave resistance, all of them were killed, except 15, who escaped, and a few negroes and half-breeds, who were taken prisoners Consult Pickett, *History of Alabama*, vol ii (Charleston, 1851), Lossing, *Field Book of the War of 1812* (New York, 1869), Dawson, *Battles of the United States* (ib, 1858)

FORT MONROE'. A United States military post, situated at Old Point Comfort, Elizabeth City Co, Va, and commanding the entrance to Hampton Roads It is the headquarters of the coast defenses of Chesapeake Bay There are a post office and telegraph station at the post, which includes a reservation of 282 acres The station of the Artillery School (postgraduate), with quarters for 100 officers and 900 men, is located here, 10 companies being stationed here in 1914 For two years after the close of the Civil War Jefferson Davis (q v) was imprisoned here

FORT MONTGOM'ERY. A fort on the Hudson, near West Point, intended to close the river against the British fleet in 1777

FORT MOR'GAN. A United States military post in Alabama, occupying a reservation of 322 acres on Mobile Point, the eastern entrance to Mobile Bay, 30 miles from Mobile The post office is Mobile, and there is a telegraph station at the post The garrison in 1914 consisted of two companies of coast artillery See MOBILE POINT

FORT MORGAN A city and the county seat of Morgan Co, Colo, 70 miles northeast of Denver, on the Chicago, Burlington, and Quincy, and the Union Pacific railroads, and on the South Platte River (Map Colorado, F 1) It contains a monument on the site of the old fort, which at one time marked the Denver and Pike's Peak cut-off from the Overland trail The industrial establishments include a beet-sugar factory, grain elevator, and flour mill Stock raising is also carried on The electric-light plant and water works are owned and operated by the city Pop, 1900, 634, 1910, 2800

FORT MOULTRIE, mōō'trĭ *or* mōōl'-, *often* mōl'trĭ A fort on Sullivan's Island, at the entrance to Charleston harbor, notable for its defense against the British in the Revolutionary War In the summer of 1776 Sir Peter Parker, with a fleet, and Sir Henry Clinton, with a force of British regulars, proceeded to Charleston harbor for the purpose of taking Charleston and of using that place as a base of operations against the Southern Colonies A total American force of about 6500 had assembled for the defense of Charleston, of which 435, under Col William Moultrie, were stationed in an unfinished fort, then known as Fort Sullivan, at the eastern end

of Sullivan's Island On June 28 Sir Henry Clinton took up a position on the sand bank near Sullivan's Island, with the intention of crossing over and making a land attack Meanwhile Sir Peter Parker, with his fleet, made a vigorous attack on the fort, but, after an artillery duel lasting almost 10 hours, was forced to withdraw Owing to the depth of the shoals, through which he had expected to reach Sullivan's Island, Clinton was detained on the sand bank and virtually took no part in the engagement The effect of the victory was to insure the Southern States from invasion for almost two years Subsequently the name of the fort was changed to Fort Moultrie On May 7, 1780, a short time before the capture of Charleston by the British, the fort was forced to surrender

Immediately before the outbreak of the Civil War, Fort Moultrie was occupied by the United States garrison assigned for the defense of Charleston harbor, but on Dec 26, 1860, the fort being virtually unprotected from land attack, and hostilities appearing imminent between the Federal and State forces, Major Anderson removed the garrison to Fort Sumter (q v) A detachment of South Carolina militia promptly took possession, and subsequently during the war Fort Moultrie formed one of the important defenses of Charleston against Federal attacks. Consult Dawson, *Battles of the United States* (New York, 1858), Doubleday, *Reminiscences of Forts Sumter and Moultrie in 1860–61* (ib, 1876), McCrady, *History of South Carolina in the Revolution, 1775–80* (ib, 1901)

FORT MY'ER A United States military post in Virginia occupying a reservation of 186 acres on the west bank of the Potomac River, opposite Washington, D C, which is the telegraph station There are a post office and telephone at the post, which was named after Gen A J Myer, the founder of the Signal Service, U S A Here were quartered in 1914 a squadron of cavalry and a battalion of field artillery.

FORT NIAG'ARA A fort at the mouth of the Niagara River, on the American side La Salle seems to have built a house here in 1669, and a fortified trading post, called Fort Conti, 10 years later, but both were soon destroyed In 1686 Denonville built here a fort, which was named in his honor Soon afterward this place was besieged by the Senecas In September, 1688, the fort was destroyed and abandoned, but in 1725–26 Vaudreuil built here another fort, called Fort Niagara, which was destined to be more permanent, and which was soon recognized, not only as the most important military station on the Great Lakes, but also as perhaps the greatest trading post in the country During the French and Indian War it was the objective point of a futile expedition under Governor Shirley of Massachusetts in 1755, and in July, 1759, after a siege of about 16 days, was captured by a British and Indian force under Sir William Johnson In July 1764, important treaties were made here by Sir William Johnson with various Indian tribes who had participated in Pontiac's War During the Revolutionary War the fort was the starting point of many expeditions sent to ravage the Western frontier, was the headquarters for a time of John Butler and Joseph Brant, and was the place where the Wyoming and Cherry Valley expeditions were organized Finally, in August, 1796, it was evacuated by the British, in accordance with the Treaty of 1783, and was immediately occupied by an American garrison It was bombarded from Fort George (q v), on Oct 13–14, 1812, was captured by the British on Dec 19, 1813, and was again surrendered to the United States on March 27, 1815 In May, 1826, various circumstances having combined to make the fort relatively unimportant from a military point of view, the United States garrison was wholly withdrawn Consult Porter, *A Brief History of Old Fort Niagara* (Niagara Falls, 1896), Marshall, *The Niagara Frontier* (Buffalo, 1865), Severance, *Old Trails on the Niagara Frontier* (2d ed, ib, 1903), Emerson, *The Niagara Campaign of 1759* (2d ed, ib, 1909)

FORT NINETY-SIX (S C) See NINETY-SIX

FORT O'GLETHORPE A United States military post at Dodge, Ga, near Chickamauga Park and 11 miles from Chattanooga, Tenn, garrisoned in 1914 by a regiment of cavalry

FORT ONTARIO, ŏn-tā'rĭ-ō A United States military post at Oswego, N Y, which is the nearest post office, telegraph, and railway station It is usually garrisoned by a battalion of infantry

FORTOUL, fôr'tōōl', HIPPOLYTE NICHOLAS HONORÉ (1811–56) A French author and statesman He was born at Digne and became a professor of the history of literature at Toulouse in 1845 and at Aix in 1846 In 1849 he was elected deputy from the Department of Basses Alpes and joined the party of Louis Bonaparte After a few weeks (October 28–December 2) in the Ministry of Marine, he became, on the coup d'état, Minister of Public Instruction and did his best to serve the new régime, especially in carrying out the Law of 1850, in its narrow opposition to the university He stopped the courses of Jules Simon at the Sorbonne and retired Quinet and Michelet from the Collège de France, suppressed the chair of philosophy and replaced it by a chair in logic, and introduced the quasi-elective system of bifurcation, or choice between science and letters This plan, and the introduction of practical features—farming in the primary schools and drawing in the *lycées*, e g — were the only points in which Fortoul showed himself an educator and not a mere politician As an author, he opposed romanticism, notably in his novel *Grandeur de la vie privée* (1838) He also wrote *De l'art en Allemagne* (1841), and *Etudes d'archéologie et d'histoire* (1854)

FORT PAYNE A town and the county seat of De Kalb Co, Ala, 92 miles northeast of Birmingham, on the Alabama Great Southern Railroad (Map Alabama, D 1) It has coal and iron mining interests, and among its industrial establishments are brick and cooperage plants and a hosiery mill Pop, 1900, 1037, 1910, 1317

FORT PICK'ENS A fort on Santa Rosa Island, Fla, commanding the entrance to Pensacola harbor, and intended as a defense to the harbor and the United States Navy Yard at Warrington Early in 1861, at the outbreak of the Civil War, it was under the command of Lieut Adam J Slemmer (q v), who transferred hither the small garrison of Fort Barrancas, directly opposite, and with a force numbering only 81 withstood for some time a siege by a large force of Confederates under Gen Braxton Bragg (q v) Federal reenforcements, under Col Harvey Brown, arrived in the middle of April to relieve Slemmer and his garrison, and the fort was held by the Federals throughout the war

FORT PIL'LOW A fort in Tennessee, on the east shore of the Mississippi River, about 40 miles north of Memphis, the scene of the so-called "Massacre of Fort Pillow" during the Civil War It was constructed by the Confederates, under the direction of General Pillow, in the spring of 1862, but was abandoned and dismantled by them on May 25 of the same year and on June 5 was occupied by a small Federal force Subsequently it was a starting point for a number of Federal raids, but was regarded as of relatively little strategic importance and was never strongly garrisoned On April 12, 1864, it was attacked by a strong Confederate force under Gen Nathan B Forrest (q v) After offering a stubborn resistance, prolonged even when capture had become inevitable, the garrison was overpowered and almost annihilated The Confederates were accused of having deliberately massacred the Federals, fully half of whom were negroes, after the latter had surrendered, and color was given to the charge by Forrest's summons to surrender, which closed with the words "Should my demand be refused, I cannot be responsible for your command" The testimony, moreover, of the survivors almost unanimously confirmed the charge On the other hand, Forrest and his officers always asserted that the resistance of the garrison was insanely and recklessly prolonged, that the garrison never surrendered, that the Confederates ceased firing as soon as one of their own officers had cut down the United States flag, and that no prisoners, white or colored, were killed or maltreated President Lincoln, while believing that a massacre had been perpetrated, was convinced it had neither been ordered nor suggested by Forrest The Confederate loss was 20 killed and 60 wounded Consult Johnson and Buel, *Battles and Leaders of the Civil War*, vol iv (New York, 1887), Nicolay and Hay, *Abraham Lincoln A History*, vol vi (ib, 1890), Wyeth, *Life of General Forrest* (ib, 1899), Mathes, *General Forrest* (ib, 1902), in the "Great Commanders Series"

FORT PLAIN A village in Montgomery Co, N Y, 38 miles southeast of Utica, on the New York Central and Hudson River Railroad, and on the Barge Canal (Map New York, F 5) There are knitting and silk mills, machine shops, furniture factories, creameries, wagon works, and manufactories of pianos, metal wheels, and condensed milk These are greatly facilitated by abundant water power The village owns its water works Pop, 1900, 2444, 1910, 2762

FORT POR'TER. A United States military post, established in 1867 Originally, in 1844, there was a defensive work at Black Rock At the fort a battalion of infantry was stationed in 1914

FORT PREBLE, prĕb'l A United States military post, established in 1808 and occupying a reservation of 24 acres at Spring Point, on the east side of Portland harbor, Me, 2 miles from the city of Portland, which is the post-office and telegraph station Its garrison in 1914 was a detachment of coast artillery

FORT PULAS'KI. A fort erected on Cockspur Island, Ga, for the defense of the Savannah River It was occupied by the Confederates at the beginning of the Civil War, and on April 11, 1862, after a vigorous bombardment, was captured by the Federals, its garrison then numbering 350 men, under Col Charles H Olmstead

FOR'TRESS. Sometimes popularly, though never in the United States officially, used for fort (q v) In English textbooks the word "fortress" is still employed to designate a large permanent fortification, permanently garrisoned, and usually including several forts See FORTIFICATION

FORTRESS ARTILLERY is *artillery of position*, consisting of guns permanently mounted in fortifications, either land or sea, and is thus distinguished from *mobile artillery*, consisting of guns designed to accompany or to follow armies in the field In the United States the Coast Artillery Corps is charged with the care and use of the fixed and movable elements of land and coast fortifications See COAST ARTILLERY, ORDNANCE

FORTRESS MONROE See FORT MONROE

FORT RI'LEY An army post located on the United States military reservation of Fort Riley, consisting of 19,447 acres, situated on the Kansas River, about 3½ miles from Junction City in Geary Co, Kans The post office, telegraph, and railroad station are at the post of Fort Riley The post was first known as Camp Centre, being near the geographical centre of the United States, but was subsequently named after Gen B C Riley, U S A The garrison consisted in 1914 of a regiment of horse artillery and a regiment of cavalry The Mounted Service School is also located at Fort Riley

FORT ROB'INSON A United States military post, on White River, 3 miles from Crawford, Neb There are a post office and telegraph station at the post, which has quarters for 520 men and cavalry stables for 530 horses It was established in 1874 and occupies a reservation of 20 square miles Its garrison in 1914 was two troops of cavalry

FORT ROY'AL See FORT DE FRANCE

FORT ST. MICHAEL. A garrisoned post of two companies on St Michael Island, Alaska (Map Alaska, F 4). It is the southern terminus of the Nome wireless system of the Signal Corps

FORT ST PHIL'IP See FORT JACKSON

FORT SAM HOUSTON, hū'ston A United States military post, established in 1865, as the post of San Antonio, Tex, and occupying a reservation of 469 acres, near the city of San Antonio, which is the telegraph station It is a valuable strategic point on the southern frontier There is a post office at the post In 1914 it was garrisoned by a regiment of cavalry and three batteries of field artillery

FORT SCHUYLER, skī'lĕr See FORT STANWIX, ROME, N Y

FORT SCHUYLER A United States military post, which forms one of the defenses to the northern entrance to the harbor of New York The post was established in 1856, although the fortification was begun in 1833 The reservation comprises 52 acres, on Throgg's Neck, Long Island Sound, 3½ miles from Westchester Station, New York City, which is the post office and telegraph station The garrison in 1914 was a detachment of coast artillery

FORT SCOTT A city and the county seat of Bourbon Co, Kans, 98 miles south of Kansas City, on the St Louis and San Francisco, the Missouri, Kansas, and Texas, and the Missouri Pacific railroads, and on the Marmaton River (Map Kansas, H 7). It has a Carnegie library and Mercy Hospital The city is in a region of great mineral wealth, deposits of coal, flagstone,

cement rocks, clays, mineral paints, zinc, and lead being found There are foundries and machine shops, flouring mills and grain elevators, railroad shops, overall factory, cement, pottery, brick, and tile works, and manufactories of sirup, harness and saddlery, medicines, etc Fort Scott has adopted the commission form of government The city owns its water works Pop, 1900, 10,322, 1910, 10,463, 1914, 10,522, 1920, 10,693

FORT SHER'IDAN A United States military post, established in 1887, in the State of Illinois, on Lake Michigan, about 25 miles from Chicago The reservation comprises 632 acres There are a post office and telegraph station at the post, which has quarters for infantry, cavalry in large numbers, and field artillery.

FORT SILL A United States military post in Oklahoma, situated on the Chicago, Rock Island, and Pacific Railroad, a railway station, telegraph, and post office being located at the fort Here in 1911 was established a school of fire for field artillery which is attended by officers of the regular army and militia A number of batteries (five in 1914) and the headquarters of a field artillery regiment usually form the garrison

FORT SLO'CUM. A United States military post on Long Island Sound off New Rochelle, New York, from whose railway station it is 2 miles distant There are a post office and telegraph station at the post, which is occupied as a recruit depot Its armament consists of mortars and rapid-fire guns.

FORT SMITH A city and one of the county seats of Sebastian Co, Ark, at the junction of the Arkansas and Poteau rivers, and on the St Louis and San Francisco, the Arkansas Central, the Midland Valley, the Kansas City Southern, the Fort Smith and Western, and the St Louis, Iron Mountain, and Southern railroads (Map Arkansas, A 2) Four steel bridges span the rivers at this place, and among other noteworthy features are the United States courthouse and post office, the Peabody public school, St Anne's Academy, high-school building, Carnegie library, city park, three hospitals, the old fort, and a national cemetery Fort Smith has important wholesale-jobbing interests in groceries, meats, dry goods, drugs, furniture, leather goods, etc, a large trade in coal, corn, cotton, lumber, live stock, and hides; and extensive manufactures of furniture and wagons There are also saw and planing mills, cottonseed-oil mills, iron and steel rolling mill, and manufactories of brooms, stoves, wheelbarrows and drays, overalls, refrigerators, etc Settled in 1838, Fort Smith was first incorporated in 1842 and was chartered as a city of the first class in 1886. It adopted the commission form of government in 1913 The city owns its water works, which cost $1,000,000 Pop, 1900, 11,587; 1910, 23,975, 1914 (U S est), 27,136, 1920, 28,811

FORT SNEL'LING A United States military post in Minnesota, at the junction of the Minnesota and Mississippi rivers, 7 miles from St Paul and 8 miles from Minneapolis It was established in 1820 as an outpost in the Indian country, and embraces a reservation of 1531 acres There are a post office and telegraph station at the post, which was named after Col. Josiah Snelling, U S A, its first commander Its garrison in 1914 was a battery of field artillery, though there are quarters for a larger body

FORT STAN'WIX. A fort built in 1758, by Brigadier Stanwix, on the site of the present Rome, N Y, and near the spot where another fort, soon abandoned, had been built in 1756 From its location on the watershed between Lake Ontario and the Hudson, it commanded the principal line of communication between New York and Upper Canada Here, in the fall of 1768, a treaty was negotiated by Sir William Johnson with the Six Nations, about 3200 Indians being present. The latter agreed, for the sum of $10,000 in money and goods, to surrender their title to a vast tract of territory which now constitutes Kentucky, West Virginia, and the western part of Pennsylvania Soon afterward the fort was dismantled, but in 1776 it was rebuilt and named Fort Schuyler, in honor of Gen Philip Schuyler In the following year Col Peter Gansevoort, with a garrison of about 750, held it from August 3 to August 22 against St Leger, with a force of about 1700 British regulars, Tories, and Indians The fort was destroyed by flood and fire in 1781, but was subsequently rebuilt again as Fort Stanwix, and here, on Oct 22, 1784, Oliver Wolcott, Richard Butler, and Arthur Lee, acting on behalf of the Continental Congress, negotiated an important treaty with the Six Nations Consult W M Sloane, *The French War and the Revolution* (New York, 1901)

FORT STE'PHENSON. See FREMONT, Ohio

FORT STE'VENS. A United States military post, in Clatsop Co, Ore, 110 miles from Portland, on the Spokane, Portland, and Seattle Railroad, and at the mouth of the Columbia River (Map. Oregon, A 1) It was established in 1864 and includes a reservation of 1250 acres In 1914 the post had as a garrison three companies of coast artillery The electric-lighting plant is owned by the Federal government Pop, 1914 (local est), 500

FORT STRONG A United States military post, on the east end of Long Island, Boston harbor, Mass The garrison consists of four companies of coast artillery, and Fort Standish is connected as a subpost

FORT SUM'TER. A fort on an island at the entrance of Charleston harbor, about 3 miles from Charleston, the firing upon which by the Confederates, in April, 1861, precipitated the Civil War Work was begun on the fortifications about 1830, but was subsequently discontinued, and in 1860 the fort was still in an unfinished condition For illustration, see Plate of FORTIFICATIONS On November 21 Major Robert Anderson replaced Col J L. Gardner as commander of the forts in Charleston harbor and, like his predecessor, occupied Fort Moultrie (q v) Hostilities with the State forces appearing imminent, however, and Fort Moultrie being almost wholly unprotected against land attacks, he secretly removed his small garrison to Fort Sumter, on the evening of December 26 —six days after South Carolina had passed her ordinance of secession Anderson and his small garrison applied themselves with energy to the strengthening of the fortifications After much vacillation on the part of the administration at Washington, an attempt was made in January, 1861, to relieve the scantily provisioned fort, but the *Star of the West*, a merchant vessel which had been sent for this purpose, and which arrived at the mouth of the harbor early on the 9th, was fired upon by the authorities and forced to put back After the inauguration of President Lin-

coln the policy to be pursued with regard to Fort Sumter was the subject of many cabinet discussions and, in large part, of the unofficial negotiations between Seward and the Confederate commissioners in Washington (See CONFEDERATE STATES OF AMERICA) On April 9 President Lincoln notified Governor Pickens that an attempt would be made to send provisions to the fort, and on the 11th, acting under orders from President Jefferson Davis, General Beauregard, in command of the Confederate forces at Charleston, demanded the evacuation of the fort Anderson promptly refused to withdraw, though, after a prolonged conference with his officers early on the 12th, he wrote "I will evacuate Fort Sumter by noon on the 15th instant, and I will not in the meantime open my fires upon your forces, unless compelled to do so by some hostile act against this fort or the flag of my government, should I not receive prior to that time controlling instructions from my government or additional supplies" This answer proved unsatisfactory, and the bombardment of the fort began at 4 30 A M, though Anderson did not return the fire until 7 o'clock Meanwhile, on the same morning, the relieving fleet sent by President Lincoln arrived at the mouth of the harbor, but was able to accomplish nothing The artillery duel continued throughout the 12th, and during the morning and part of the afternoon of the 13th, when terms of evacuation were agreed upon between Anderson and Beauregard, the garrison, which consisted of only 128 men, leaving the fort on the following day with the honors of war There was no one wounded or killed on either side during the bombardment The contest was of immense importance, since it marked the beginning of the Civil War and put a stop to all peace plans and negotiations

After taking possession the Confederates greatly strengthened the fort, both for offensive and defensive operations On April 7, 1863, a Federal fleet of nine ironclads—the *Weehawken, Passaic, Montauk, Patapsco, New Ironsides, Catskill, Nantucket, Nahant,* and *Keokuk*—under Admiral Dupont attacked the fort with great energy and gallantry, but after an engagement of about two hours and a half was repulsed, the *Keokuk* sinking on the following day, and several vessels being considerably damaged General Gillmore, the commander of the land forces engaged against Charleston, established breaching batteries on Morris Island, and after a seven days' bombardment, Aug 17–23, 1863, virtually reduced the fort to ruins Thenceforth it was garrisoned only by a small force of infantry, which held it in spite of frequent bombardments, a gallant boat attack made by a force of 400 men under T H Stevens, on the night of Sept 8, 1863, and of a disastrous magazine explosion on Dec 11, 1863, until Feb 17, 1865, when it was finally evacuated During 1863–65 Fort Sumter was commanded successively by Colonel Rhett, Major Stephen Elliott, Capt J. C Mitchell, and Capt T A Huguenin On April 14, 1865, by order of Secretary Stanton, General (formerly Major) Anderson raised over the fort the same flag which he had been forced to lower exactly four years before Consult *Official Records,* Johnson and Buel, *Battles and Leaders of the Civil War,* vols i and iv (New York, 1887), Anderson, *Political Conspiracies Preceding the Rebellion; or, The True Stories of Sumter and Pickens* (ib, 1882), Crawford, *Genesis of the Civil War The Story of Sumter, 1860–61* (ib, 1887), Doubleday, *Reminiscences of Forts Sumter and Moultrie in 1860–61* (ib, 1876), Gillmore, *Report on Engineer and Artillery Operations Against Charleston in 1863* (Washington, 1865), Rhodes, *History of the United States from the Compromise of 1850,* vol iii (New York, 1895)

FORT TER'RY A United States military reservation of 150 acres, on Plum Island, between Long Island Sound and Gardiner's Bay, N Y The post office and telegraph station are at New London, Conn, 13 miles distant The works are garrisoned by six companies of coast artillery

FORT THOMAS, tŏm'as A United States military post, established in 1887, consisting of a reservation of 280 acres (including a rifle range of 169 acres) It is situated in Kentucky, on a bluff overlooking the Ohio River, 3 miles from Newport, Ky, and 4 miles from Cincinnati There are a post office and telegraph station at the post The garrison in 1914 was two battalions of infantry

FORT TOT'TEN This United States military post, for many years the headquarters of the Battalion of Engineers, was established in 1862 and was originally called Willets Point The reservation comprises 136 acres on the East River at the western end of Long Island Sound, 2½ miles from Whitestone The post is the station of the School of Submarine Defense and is the torpedo depot It is one of the defenses of the northern entrance to New York harbor and is the headquarters for the coast defenses of eastern New York Seven companies of artillery were stationed here in 1914

FORT TRUM'BULL A former United States military post, established in 1839 and occupying a reservation of 13 acres on the south side of New London harbor, Conn In 1777 a small redoubt by this name, and another in 1812, occupied this site

FORTU'NA (Lat, from *fors,* chance, probably connected with *ferre,* to carry In this view Fortuna is the "bringer" of good or evil fortune) In classical mythology, the goddess of chance, called by the Greeks Tyche According to Hesiod, she was a daughter of Oceanus, according to Pindar, a sister of the Parcæ She differed from Destiny or Fate in so far that she worked without law, giving or taking away at her own good pleasure and dispensing joy or sorrow indifferently She had temples at Smyrna, Corinth, and Elis In Italy she was extensively worshiped from a very early period and had many names, such as *Patricia, Plebeia, Equestris, Virilis, Primigenia, Publica, Privata, Muliebris, Virginensis,* etc, which indicate the extent and also the minuteness of her superintendence Particular honors were paid to her at Antium (Horace, *Odes,* i, 35) and at Præneste, in the temple of the former city two statues of her were even consulted as oracles The temple of Fortuna Primigenia at Præneste was consulted especially by women, who sought to learn the fate of their first-born children (*primigeni*) Her worship was said to have been introduced in Rome by Servius Tullius Greek poets and sculptors generally represented her with a rudder, as a symbol of her guiding power, and with a cornucopia, as a symbol of prosperity, or with a ball, or wheel, or wings, as a symbol of her mutability Consult Fowler, *Roman Festivals* (London, 1899), and Wissowa, *Religion und Kultus der Romer* (2d ed, Munich, 1912).

FORTUNA'TÆ IN'SULÆ See CANARY ISLANDS

FORTUNATE ISLANDS See ISLANDS OF THE BLESSED

FORTUNATIA'NUS, ATIL'IUS A Roman grammarian, probably of African birth, who in the fourth century A D wrote a treatise on the metres of Horace (q v) Prefixed to the discussion of the Horatian metres is an account of the basic ideas of metre in general and of the rules of prosody For the treatise, see Keil, *Grammatici Latini,* vol vi Consult Teuffel, *Geschichte der romischen Literatur,* vol iii, §405 3 (6th ed , Leipzig, 1913)

FOR'TUNA'TUS The chief figure of a popular tale, or rather collection of tales, centring about the fortunes and misadventures of Fortunatus and his sons with a wishing cap and an inexhaustible purse, which prove their possessor's ruin Many of the materials are ancient, apparently Oriental, but the composition is German of about 1450 *Fortunatus* was first printed at Augsburg in 1509 (reprinted in Simrock's *Deutsche Volksbucher* (1846), and often afterward in German, French, Italian, Dutch, English, Danish, Swedish, Icelandic It was dramatized by Hans Sachs (1553) and in English by Thomas Dekker (1600), whose play, *The Pleasant Comedie of Old Fortunato,* was turned back into German in 1620 and continued its influence in Germany for two centuries. The best modernization of the story is by Tieck (q v) in *Phantasus* (1816) Uhland left an unfinished narrative poem on Fortunatus, and the idea was used by Chamisso in his *Fortunati Glucksackel und Wunschhutlein* Consult *Die deutschen Fortunatusdramen* (1892)

FORTUNATUS, VENANTIUS HONORIUS CLEMENTIANUS (c 530–c 600) Bishop of Poitiers and chief Latin poet of his time He was born at Ceneda, near Treviso, and studied at Ravenna After traveling through Germany and France he took up his residence at the court of Sigbert, King of Austrasia, where he wrote an epithalamium to celebrate the King's marriage with Brunhilda He again took up the wandering life, but finally settled at Poitiers, where he was brought into association with Radegunda, wife of Clotaire II, who was living there in retirement in a convent which she had founded, and also met Gregory of Tours and other eminent ecclesiastics He became a priest and in 599 was chosen Bishop of Poitiers. Fortunatus wrote hymns, epitaphs, poetical epistles, verses in honor of his patrons, and descriptions of events in his life He also wrote a life of St Martin of Tours and several other lives of saints His hymn, *Vexilla regis prodeunt* (The royal banners forward go), is well known in the English translation by J M Neale His works are in Migne, *Patrol Lat*, lxxxviii (Paris, 1844–80), the best edition is by Leo and Krusch (Berlin, 1881–85) For his life consult Leroux (Paris, 1885), Nisard (ib, 1880), Meyer (Berlin, 1901)

FOR'TUNE. A poem attributed by John Shirley to Chaucer It first appeared in a set of poems brought together by the latter, the manuscripts of which are now in the Harleian collection in the British Museum Its sources were partly Boethius and partly the *Roman de la Rose*

FOR'TUNE, ROBERT (1813–80). A Scottish botanist and traveler, born at Kelloe, Berwickshire He was employed in the Edinburgh Botanical Gardens and at the conclusion of the Chinese War in 1842 was sent to collect plants in northern China by the Royal Horticultural Society A second journey to China in 1848 gave to Europe many of the beautiful flowers of the Far East and also resulted in the introduction of the tea shrub into India, where formidable competition with China in the production of tea immediately began A third expedition included Formosa and Japan, and in 1857 Fortune again visited China to collect seeds of the tea shrub for the United States Patent Office His published works include *Three Years' Wanderings in the Northern Provinces of China* (1847), *Report upon the Tea Plantations in the Northwest Provinces* (1851), *A Journey to the Tea Countries of China* (1852), *Two Visits to the Tea Countries of China* (1853), *A Residence among the Chinese* (1857), *Yeddo and Peking A Narrative of a Journey to the Capitals of Japan and China* (1863)

FORTUNE, TEMPLE OF One of the most ancient extant temples of Rome and one of the best preserved, in the Forum Boarium, near the Æmilian Bridge It was erected by Servius Tullius and was rebuilt in the third century B C In the ninth century A D the spaces between the columns were walled up, and the edifice became the church of Santa Maria Egisiaca The temple is remarkable for its pure Ionic architecture The exterior was covered with painted stucco It contained a wooden statue, covered with two togas, which Pliny the Elder says lasted until the time of Tiberius, some thought this a statue of Servius Tullius, others a statue of Fortuna (q v). Consult Platner, *The Topography and Monuments of Ancient Rome* (2d ed, Boston, 1911)

FORTUNE, THE A playhouse which once stood near Blackfriars Bridge, London, near the site of the ancient monastery of the Black Friars It was first erected in 1599 by Philip Henslowe and Edward Alleyne and occupied by the Lord Admiral's Company. It was originally of wood, was burned down in 1621, was rebuilt in brick, and was torn down by the Puritans in 1649 Consult H B Baker, *History of the London Stage, 1576–1903* (2d ed, London, 1904)

FORTUNE BAY A bay on the south coast of Newfoundland, in lat 47° 30′ N, and extending inland in an easterly direction from long 56° west about 65 miles (Map Newfoundland, E 5) At its entrance is Brunet Island, and to the southwest are the fishing islands of St Pierre and Miquelon, the last vestiges of French power on the North American continent.

FORTUNES OF MOLL FLAN'DERS, THE A novel by Defoe (1722)

FORTUNES OF NIGEL, nī'jĕl, THE. An historical novel by Walter Scott (1822)

FORTUNE TELLING The telling of fortunes, whether by the arts of astrology, palmistry, or other forms of divination, was not an offense at the common law But by the English Vagrancy Act of 1824 (5 Geo IV, c 83) any person who pretends to tell fortunes or practice palmistry is liable to summary punishment by imprisonment as a rogue and a vagabond Modern statutes in this country generally class those "pretending to tell fortunes" as disorderly persons and provide for their arrest and punishment as misdemeanants

FORTU'NIO. The daughter of an octogenarian lord, who in disguise goes as her father s substitute when he is summoned for military

service With the aid of resources granted her by a fairy, she accomplishes many wonderful feats The character appears in many fairy tales, ancient and modern

FORTUNY Y CARBO (fôr-tōō'nē ē kär'bō) **MARIANO,** JOSÉ MARÍA (1838–74) A Spanish painter and etcher He was born at Réus in Catalonia, June 11, 1838, and grew up in poverty An allowance of 42 francs a month from his home town enabled him to study at the academy at Barcelona under Claudio Lorenzalez, and he also received inspiration from lithographs of Gavarni, but afterward he turned for his motives directly to nature In 1857 he won a school prize which enabled him to study at Rome During the Spanish war against Morocco (1859–60), he was on the staff of General Prim, completely absorbed in sketching those Oriental scenes which appealed most strongly to his nature The glitter, opulent color, savage movement, and dreary contemplation of the Orient are truthfully depicted in the sketches and pictures painted on his return to Rome With a view of copying the Spanish masters he went, in 1865, to Madrid, where he fell somewhat under the influence of Goya There he made the acquaintance of Madrazo, whose daughter he afterward married In 1866 he visited Paris, where he frequented the studios of Gerôme and Meissonier, and received from the art dealer Goupil commissions which placed him above want Soon he settled in Rome and henceforth devoted himself to kaleidoscopic pictures of the Rococo period, which became his special province His studio in Rome was a salon in which men of letters, artists, and many brilliant members of the social world were wont to congregate After another visit to Paris and a two years' stay in Granada, he returned to Rome in 1874, where he died of malarial fever His canvases are usually small in dimensions and, though filled with multitudinous details, are painted with great freedom, skill, and vivacity of color He was very successful in dazzling sunlight effects The city hall of Barcelona contains several of his paintings, notably the "Battle of Tetuan," a commission from the city of Barcelona, 32 metres long, but unfortunately not finished The Museo de Arte Moderno at Madrid contains "Queen-Regent Maria Christina and her Daughter Inspiring the Government Troops"

Fortuny's work was, until the advent of impressionism, the dominating influence in Spanish art, in so far as the latter was individual, and it influenced the French and Italian schools as well. Of his Oriental subjects, the best known are the "Praying Arab," "Tribunal of a Cadi," and, especially, the "Snake Charmers" (1869), in the Walters Gallery, Baltimore, the last of which he duplicated His most celebrated Rococo picture is the "Spanish Marriage," known as "La Vicaria" (1868, Marquise de Carnano, Paris), containing portraits of the painter Regnault (q v.), Madame Fortuny, and other friends Others are "The Butterfly" and "Trial of the Model," owned by W Clark, New York, the 'Poet," the "Rehearsal," the "China Vase" (Walters Gallery, Baltimore). There is a large number of his works in America, both in public and private possession Besides those already mentioned, there are five others in the Walters Gallery, Baltimore, including "An Ecclesiastic," "Don Quixote," and the "Mendicant" The Metropolitan Museum (including the Vanderbilt collection) has "Arab Fantasia at Tangiers," "A Court Fool," and a portrait of a "Lady in Black," besides water colors

Fortuny was also an aquarellist of note and a brilliant etcher, his works resembling those of Goya Like him, he uses as a background the aquatint, and the outlines of his figures are drawn with light and spirited strokes Some of his chief etchings are the "Dead Arab," the "Shepherd," the "Reader," the "Pensioner," the "Anchorite," the "Arab Mourning" Consult the biographies of Fortuny by Davillier (Paris, 1875) and Yriarte, in *Les artistes célèbres* (ib, 1886) Consult also the *Fortuny Album*, published by Goupil (ib, 1889), and Muther, *History of Modern Painting*, vol iii (London, 1907)

FORT VAL'LEY. A city in Houston Co, Ga, 29 miles south of Macon, on the Central of Georgia and the Southern railroads (Map Georgia, C 3) It has a cotton and yarn mill, crate factory, and cotton-gin factory The water works and electric-light plant are owned by the city. Pop, 1900, 2022, 1910, 2697

FORT WADS'WORTH A United States military post, established in 1827 and occupying a reservation of 221 acres on Staten Island, N Y, commanding "the Narrows" The post office is Rosebank, N Y, and the telegraph station is Quarantine, Clifton, S I It was named for Gen J S Wadsworth, who was killed in the battle of the Wilderness (1864) Its garrison in 1914 was two companies of coast artillery

FORT WALLA WALLA, wŏl'lä wŏl'la A former United States military post, established in 1857 and occupying a reservation of 612 acres, 1 mile from Walla Walla, Wash

FORT WAR'REN. A United States military post, established in 1837 and occupying a reservation 28 acres in extent on Georges Island, 7¼ miles southeast of Boston, Mass The post was first occupied in 1861 and during the Civil War was used as a military prison The post office and telegraph station is Boston, Mass It is the headquarters for the coast artillery district of Boston The garrison in 1914 comprised a company of coast artillery

FORT WASH'INGTON An important military post during the American Revolution, occupying the highest part of Manhattan Island and covering the ground overlooking the Hudson between the present 181st and 186th Streets, New York It was surrendered to the English under Sir William Howe on Nov 16, 1776 After the battle of White Plains (q v) Washington crossed over to New Jersey, but, against his better judgment, left a considerable force under Colonel Magaw in Fort Washington Howe invested the fort on November 15 and commanded the garrison to surrender on pain of being put to the sword Magaw replied that he would defend the place to the last extremity The next day the British attacked in four divisions, led respectively by General Knyphausen and General Matthews (supported by Lord Cornwallis), Lieutenant Colonel Sterling and Lord Percy Soon after daybreak the cannonading began, and it continued with great fury on each side until noon Knyphausen's Hessians then advanced in two columns, one of which, under General Rahl, ascending circuitously to the summit of the hill, penetrated Magaw's advanced works, while the other ascended the hill in a direct line, suffering much on the way from the well-directed fire of Colonel

Rawling's riflemen The second division made good their landing, forced the opposing Americans from their sheltering rocks and trees up a steep and rugged hill, while the third, landing under a heavy fire, succeeded, after a stubborn fight, in carrying an advanced redoubt Percy's division, with conspicuous gallantry, carried other advanced works On a second summons from Howe, Magaw, seeing the uselessness of further resistance, surrendered the fort, his troops (2700 in number) becoming prisoners of war The American loss in killed and wounded was 130, the British, 454 The English had been materially assisted by the treason of one of Magaw's officers, William Demont, who on November 2 had deserted and furnished Howe with detailed plans of the American works The loss of the fort caused great consternation throughout the United States and has been regarded as in some respects one of the greatest military misfortunes of the Americans during the war, the garrison representing the flower of Washington's army. Consult De Lancey, *The Capture of Fort Washington, the Result of Treason* (New York, 1877), Dawson, *Battles of the United States* (ib, 1858), Carrington, *Battles of the American Revolution* (ib, 1876)

FORT WASHINGTON. A United States military post, established in 1815 and comprising a reservation of 334 acres on the left bank of the Potomac River, 13 miles below Washington, D C, in Maryland The usual garrison consists of three companies of coast artillery

FORT WAYNE. A United States military post, established in 1842 and containing a reservation of 63 acres on the Detroit River, 4 miles from the city of Detroit, which is the post office and telegraph station There are quarters for a battalion of infantry

FORT WAYNE. A city, railroad centre, and the county seat of Allen Co, Ind, 150 miles by rail east by south of Chicago, Ill, at the junction of the St Joseph's and St Mary's rivers, which here unite in the Maumee, and on the Fort Wayne, Cincinnati, and Louisville, the Pennsylvania Company, the Ohio Electric, the Lake Shore and Michigan Southern, the Grand Rapids and Indiana, the New York, Chicago, and St Louis, the Wabash and the Cincinnati, Hamilton, and Dayton railroads (Map: Indiana, G 2). It occupies an area of nearly 10 square miles on a plateau at an elevation of 775 feet and has a United States government building, a courthouse that cost more than $1,000,000, St. Joseph's, Hope, and Lutheran hospitals, Indiana School for Feeble-Minded Youth, a fine high-school building, orphan asylums, a public-library building, for the erection of which Andrew Carnegie gave $90,000, several fine public parks and boulevards, and monuments to Anthony Wayne and Henry W Lawton It is also the seat of Concordia College (Lutheran), opened in 1839 This city is in an agricultural district and is important as the manufacturing and distributing centre for a vast territory The industrial plants include shops of the Pennsylvania and the Wabash railroads, foundries and machine shops, wheel works, flouring mills, electric-light works, knitting mills, oil-tank works, breweries, packing houses, and manufactories of chemicals, soap, steel dredges, mining concentrators, cigars, pianos, fertilizers, paper, dairy and food products, shirts and waists, etc

Fort Wayne is governed under a special charter, conferred by the State Legislature, which provides for a municipal legislative body of two councilmen from each of the 10 wards, chosen biennially, a mayor and city clerk, chosen quadriennially, and a board of water-works trustees, chosen biennially The board of public works, board of public safety, health commissioner, park and street superintendents, city attorney, and city comptroller are appointed by the mayor The council fixes all municipal tax levies and appropriations and has final approval of all contracts and franchises The annual income, including revenues of water works, amounted in 1912 to $2,051,000, expenditures to $1,861,000, the principal items of expense being $59,000 for the police department (including amounts for police courts, jails, etc), $92,000 for the fire department, and $272,000 for schools The water works, costing $1,750,000, and the lighting plant and system are owned and operated by the city Fort Wayne is built on the site of the principal village of the Miami Indians and near the site of the old French Fort Miami In October, 1790, General Harmer burned the village In 1794 Gen Anthony Wayne built a fort here, which in September of 1812 was closely besieged by the Indians A village gradually grew up and was chartered as a city in 1839, though growth of the place was very slow until after the building of the Wabash and Erie Canal, and of several railroads between 1850 and 1860 Pop, 1850, 4282, 1870, 17,718, 1900, 45,115, 1910, 63,933, 1914 (U S est), 72,322, 1920, 86,549 Consult J B Dillon, *History of Indiana* (Indianapolis, 1859), W A Brice, *History of Fort Wayne* (Fort Wayne, 1868); W. H Smith, *History of Indiana* (2 vols, Indianapolis, 1903), J H Levering, *Historic Indiana* (New York, 1909)

FORT WILLIAM A city in Thunder Bay District, Province of Ontario, Canada, on the Kaministiquia River, at its entrance into Lake Superior (Map Ontario, H 8) It has a fine harbor, is favored with good water power, and carries on a large lake and rail traffic, being at the head of lake navigation on Lake Superior, a gateway to the wheat fields of western Canada, and bulk-breaking point for its incoming and outgoing freight The terminal works of the Canadian Pacific, Grand Trunk Pacific, and Canadian Northern railroads are situated here The city is connected by electric railway with Port Arthur, 3 miles distant It has a number of fine public buildings, including the city hall, courthouse, two hospitals, a public library, and a collegiate institute The manufacturing industries include flour mills, stove, machine-shop, and car-wheel foundries, shipbuilding, brickyards, aerated water works, broom, sash, and door factories, breweries, cement-block making, and electric-power works In 1914 there were 17 grain elevators, with a capacity of 27,401,000 bushels The city owns 26 miles of street railway, besides its telephone, electric light, water works, and sewerage systems It is of recent and rapid growth, and the value of its manufactured products, which in 1900 was $111,507, was in 1910 $534,097, an increase of 378 98 per cent The surrounding district is rich in agricultural products and lumber. Fort William was founded as a Hudson Bay post in 1801. There is a United States consular agent Pop., 1901, 3633, 1911, 16,499.

FORT WILLIAM. See CALCUTTA

FORT WILLIAM HENRY. A fort erected in 1755 by Sir William Johnson (q v.) on the

site of the present Caldwell, N Y, at the head of Lake George. During the early part of the French and Indian War it was an important strategic position and was the starting point for many minor expeditions against the French and Indians Rigaud, at the head of a considerable French force, made a half-hearted and unsuccessful attack upon it in the spring of 1757 (March 18–23), and later in the year Montcalm marched against it at the head of a force of about 8000, including 2000 Indians. On August 2 he demanded the surrender of the fort, then garrisoned by about 2200 men, and on the refusal of Colonel Munro, the commanding officer, began a vigorous attack Although Colonel Webb was stationed at Fort Edward, only 15 miles away, with an English and colonial force of 1600, Colonel Munro was not reenforced, and on the 9th was compelled to surrender, Montcalm agreeing that the garrison should march out with the honors of war and should be escorted to Fort Edward by a detachment of French regulars Early on the 10th the survivors began their march, but were soon set upon by the Indians, and a general massacre ensued, an unknown number of the troops being killed outright, and some 200 being carried into captivity Though this attack was not instigated by the French, contemporary evidence seems to show that no earnest effort was made by them to force the Indians to observe the treaty stipulations Cooper used this incident in his *Last of the Mohicans* Consult W M Sloane, *The French War and the Revolution* (New York, 1901), and Parkman, *Montcalm and Wolfe* (3 vols, Boston, 1906)

FORT WILLIAM H SEWARD. A garrisoned post of regimental headquarters and a battalion of infantry, being the largest post in Alaska It is located on Lynn Canal, 15 miles from Skagway Haines (Presbyterian) Mission adjoins the post

FORT WILLIAMS A United States military post, forming a portion of the defenses of Portland harbor, Me, being 4 miles distant from that city, which is the nearest railway and telegraph station There is a post office at the post, which is usually garrisoned by five companies of coast artillery

FORT WINFIELD SCOTT. A United States military post, forming one of the defenses of San Francisco harbor There are a post office and telegraph station at the post, which is 7 miles distant from the city of San Francisco The garrison in 1914 was 10 companies of coast artillery

FORT WORDEN. A United States military post in Washington at Port Townsend, forming one of the defenses of Puget Sound and 51 miles distant by boat from Seattle Its usual garrison is six companies of coast artillery

FORT WORTH. A city and the county seat of Tarrant Co, Tex, 175 miles northeast of Austin, capital of the State and 70 miles south of Red River, on the Texas and Pacific, the International and Great Northern, the Chicago, Rock Island, and Gulf, the Gulf, Colorado, and Santa Fe, the Fort Worth and Denver City, the St Louis Southwestern (Cotton Belt), the St Louis and San Francisco, Missouri, Kansas, and Texas, the Sunset-Central Lines, and other railways, and on Trinity River (Map Texas D 3) It is the seat of Texas Women's College (successor to the Polytechnic College, Southern Methodist), chartered in 1891, Texas Christian University, founded in 1889 and removed to Fort Worth in 1910, which absorbed the Fort Worth Medical College in 1913, Southwestern Baptist Theological Seminary, Masonic Orphans' Home and School for Texas, Southland University (State School of the Disciples of Christ), Academy of Our Lady of Victory and Mount Carmel Academy (Roman Catholic colleges), a number of denominational schools and others for tuition in technical subjects, art, drama, music, business, etc It contains a Carnegie library, court of Civil Appeals law library, and the Medical College medical library There are also the Paddock Viaduct and a fine system of hard-surfaced country roads, 31 public parks or parked places, about 100 churches, nine hospitals, and an electric-power plant

The centre of a vast stock-raising and agricultural country, Fort Worth has large jobbing interests and carries on an extensive trade in hogs, sheep and cattle, cotton oil, grain, fruit, and produce The industrial establishments include stockyards whose daily capacity is about 27,500 head, large packing houses, whose business in 1913 exceeded $65,000,000, grain elevators, flour, corn-meal and stock-feed mills, breweries, rolling mills, railroad repair shops, foundries and machine shops, cotton and oil mills, tin silo plants and manufactories of clothing, furniture, chemicals, candy, wagons and carriages, etc

With an ample artesian water supply, as a provision against any possible failure of that source, the city of Fort Worth built at a cost of $1,400,000 a large storage dam on the West Fork of the Trinity River, 7 miles from the city, with a storage capacity of 30,000,000,000 gallons Founded as a military post by Maj Ripley D Arnold in 1849, Fort Worth became the county seat in 1860 and was first incorporated in 1873 The commission form of government was adopted in 1907 Receipts of the city for 1913 were $1,937,271 29, expenditures, $1,861,823 01, the chief items of expense being police department $100,010, fire department $110,000, education, $359,620 03, interest charges, $242,532 30 The city owns and operates its water works Pop, 1880, 6663, 1890, 23,076, 1900, 26,688, 1910, 73,312, 1914 (U. S Census Bureau est), 94,494, 1920, 106,482

FORT YELLOWSTONE A United States military post, established in 1886 and formerly Camp Sheridan (1874) The reservation comprises 28 acres on Beaver Creek and is 5 miles from Gardiner on the Northern Pacific Railroad, within the limits of Yellowstone National Park The post office is at the fort, and telegraph station is Mammoth Hot Springs, near the post The garrison has charge of the Yellowstone National Park, including the protection of the visitors, and in 1914 was a squadron of cavalry

FORTY-NINERS. A name popularly applied to the throng of fortune seekers who emigrated to California in the years immediately following the discovery of gold there in 1848, especially to those who went during the period of greatest excitement in 1849 They were also called Argonauts They came, some by land and some by sea, from all parts of the world and had among them representatives of almost every nationality, of every color, and of every social stratum Those who came by sea embarked for the most part from ports in the Eastern States, some making the long and dangerous voyages around Cape Horn, and others proceeding to

Chagres, and thence across the Isthmus to Panama, where they again embarked on any vessel obtainable The chief carriers were the three side-wheelers, the *California*, the *Oregon*, and the *Panama*, of the Pacific Mail Steamship Company, which frequently transported more than three or four times the number of passengers for which they were designed Besides these, nondescript vessels, of every size and kind, were commissioned for the service and were likewise greatly overcrowded, while many reckless adventurers, unable to force their way aboard, left for their destination in clumsy Indian dug-outs Much as passengers by the sea suffered, however, overland travelers suffered even more The majority of these gathered from May to June of each year at Independence or St Joseph, Mo, at that time on the frontiers of civilization, and then proceeded to Sacramento in long caravans, continually harassed on the way by the Indians, and forced to suffer terribly from starvation, exposure, and fatigue. The first emigrant train reached Sacramento in August, 1849, and others followed in quick succession By the end of 1849 it is estimated that 42,000 emigrants had arrived by land and 30,000 by sea, of these, three-fourths were probably Americans Consult Bancroft, *History of the Pacific States*, vol xviii (San Francisco, 1888), id, *California Inter Pocula* (ib, 1888), Bayard Taylor, *El Dorado* (New York, 1862), Stillman, *Seeking the Golden Fleece* (San Francisco, 1877), Bret Harte, *Tales of the Argonauts* (Boston, 1875), Audubon, *Western Journal, 1849–50* (Cleveland, 1906), McIlhany, *Recollections of a 49er* (Kansas City, 1908)

FORTY THIEVES, The A band of robbers in the tale of "Ali Baba" in the *Thousand and One Nights* They dwelt in a cave in the forest, the doors of which opened only in response to the words "Open, sesame" Noldeke thinks that the power of these words may be derived from the significance oil made from sesame had in Babylonian magic (Herodotus, i, 193; Jastrow, *Religion Babyloniens und Assyriens*, ii, 759 ff) and among the Mandæans. The manuscript used by the Maronite Hanna, who told the story to Galland (see ARABIAN NIGHTS), has not been found But Macdonald has recently discovered in an Oxford manuscript an Arabic text that substantially agrees with that from which Galland's translation came. Consult Macdonald, in *Journal of the Royal Asiatic Society*, 332 ff (London, 1910), 53 (1913), Torrey, ib, 222 (1911); Noldeke, in *Zeitschrift fur Assyriologie*, 242 ff (Strassburg, 1914)

FORT YU'KON An old and well-known trading post, located on the great bend of the Yukon River, Alaska, just within the Arctic circle (Map Alaska, K 2) It has a government school for its natives, numbering about 200

FO'RUM (Lat, market place; connected with *foris*, door Forum was the "out-of-doors" place) The term applied by the Romans to the large, open, rectangular space in the central part of any city, which was the common resort of the people for worship, for business, and for pleasure It was originally an open space, without buildings, where the people met on market days, for religious ceremonials, elections, etc Ultimately it was the political centre, where the magistrates and the people met and where elections were held, here were the administrative and civic buildings or inclosures, such as the *comitium*, with its tribunals and rostra for the large assembly, the *curia*, or senate house, treasuries and basilicas, or law courts Here, too, were the more important temples. (See BASILICA) At each end of the road or roads crossing the fora were often archways, or *Jani*, used as resorts for merchants and scribes The other buildings bounded the forum on different sides and between them were shops, or *tabernæ*, belonging to the different trades

Historic Evolution In the early days of the Royal and Republican ages there appears to have been but a single forum in each Roman or Italian city, serving not only for political, legal, and mercantile purposes, but also for the popular games and amusements—the theatrical shows, wild-beast contests, gladiatorial fights, and races (See AMPHITHEATRE) The old Forum at Rome (*Forum Romanum*) and all those modeled upon it, like that of Sinuessa, were of this type The next stage was the distinction into two fora—one devoted to religion, law, administration, and politics, and the other to the sale of commodities This was due perhaps, to the influence of Greece, where there were often two agoras of this description—as at Athens The Greek term "agora" meant originally a gathering of any kind, then a gathering place for purposes of every sort; later the agoras were preeminently market places. Until recently the plan and the buildings of such Greek squares were hardly known, except from descriptions by Pausanias of those at Athens, Megalopolis, Corinth, Messene, Elatea, Sparta, and Elis, but recently agoras have been excavated, especially in Asia Minor, as at Priene, Miletus, Side, Termessus, Aphrodisias, Antiphellus, Pessinus, and Cnidus See the articles on the places named, and consult the well-illustrated article "Agora" in Smith, *A Dictionary of Greek and Roman Antiquities*, vol i (3d ed, London, 1890). But the differences between agora and forum are considerable, notably in the great importance given to law by the Romans, which finally made of the basilicas the great factor in the administrative fora

The Different Fora The third stage, however, in the differentiation of the fora had been reached before the basilica (q v) had attained this importance, this step came through the establishment of a separate forum for the sale of each important commodity. There were one or more animal or *meat* markets (*forum boarium, forum suarium, forum pecuarium*), for horned cattle, pigs, and sheep respectively, a *fish* market (*forum piscatorium*), a *wine* market (*forum vinarium*), a *vegetable* market (*forum olitorium*), a grain market (*forum pistorium*) The various industrial and mercantile trades occupied shops around these separate squares or on streets leading from them. There were evidently sometimes covered markets, such as cloth markets, like that built by Eumachia at Pompeii Out of this use of *forum* as a term virtually equivalent to "market" comes the employment of forum as part of the name of many towns, established largely as market towns Cf, e g, Forum Appii, Forum Julii, Forum Livii The city theatre often adjoined the forum, as at Ostia and Timgad, so did the circus and the amphitheatre in many cases The temples of the forum often served

more than a religious purpose, in Rome the Temple of Concord served for meetings of the Senate, and that of Saturn was at one time the State Treasury, and even the public archives (the records of the censors and financial records) were kept in it until the erection of the Tabularium (q v) In many Imperial Roman cities there was a *capitolium* in connection with the forum, a triple temple of Jupiter, Juno, and Minerva, as at Rome itself and at Suffetula Of the fora outside of Italy, those found on the sites of the cities of North Africa are the most interesting, and their ruins are numerous and especially valuable because they have been untouched The most important is at Thamugadi (Timgad), a military colony, as were so many other Roman cities in Africa It had its triumphal arches at each end of its main road, its temples, curia, scholæ of the corporations, tribunal and rostra, basilica and colonnades inclosing the square.

The fora at Pompeii are also well preserved The *forum triangulare* lay near the southern verge of the city, close to the two theatres, it had a Doric Greek temple, a colonnade on two sides, and an Ionic portico at the entrance The principal forum was about 450 feet from north to south The Temple of Jupiter, flanked by a memorial arch on each side, formerly the main entrance of this forum, was at its northern end, the Basilica and the Temple of Apollo were on the west side On the east side were the *macellum*, or market, the Temple of the Genius of Augustus, the Schola, or corporation building, and the building of Eumachia, or cloth market

The open spaces in all the fora were so filled with honorary statues, even as early as the Republican period, as well as with altars, arches, wells, memorial columns, etc , that it was necessary at times to order a wholesale removal of them (Consult Lanciani, *Ancient Rome in the Light of Recent Discoveries*, chap iv, Boston, 1889) The fora of Rome were naturally in a class by themselves, although in the fourth century A D. those of the new Imperial capital, Constantinople, were made by the Emperors from Constantine to Honorius almost to rival them in number and wealth of artistic decoration

The Forum Romanum The original Roman Forum (*Forum Romanum Magnum*) occupied the lowlands between the Palatine, the Capitoline, and the Quirinal hills, and served as political and commercial common ground for the separate tribes inhabiting these different hills, as well as for those on the Cœlian and the Esquiline hills, before the closer union under the Tarquins when Rome became one city Then the Forum took a more regular and monumental shape and was drained and surrounded by shops The original temples of Saturn (497 B C), of the Dioscuri (484 B C), and of Concord (367 B C) added substantially to its beauty, but it was not until quite late (184 B C) that the first courthouse, the Basilica Porcia, was built, to be followed by the basilicas known as Fulvia (Æmilia), the Sempronia, and the Opimia, these structures gave to the Forum the characteristic colonnaded effect that was imitated in other cities This crowding of the open space with buildings and honorary monuments, and the increasing importance of the political aspect of the Forum (as the place of meeting of people and Senate), as well as its legal aspect, led to the relegation to a separate market of the malodorous fishmongers' stalls (*forum piscatorium*), and this example was followed for the other venders, as explained above Even this failed to give sufficient room for the rapidly expanding political-judicial life of the city, and in 54 B C a new era was commenced by the construction of the Basilica Æmilia in pursuance of a scheme carried forward by Julius Cæsar, who began also the addition of the special imperial fora by the construction of the Forum Julium

Imperial Fora The Forum Julium was followed by Augustus with his Forum Augustum or Forum Martis, by Vespasian with his Forum Pacis, by Domitian and Nerva with the Forum Transitorium, and finally by Trajan with his magnificent Forum Traiani, the most superb architectural group in Rome—all communicating with the Forum Romanum in a continuous line to the north and east of it Of these, the Julian Forum was in the form of a sacred inclosure, around a temple of Venus Genetrix, Cæsar's patroness, the Augustan Forum, dedicated to Mars, who had aided Augustus, the latter said, in punishing the murderers of Julius Cæsar, was an inclosure ending in the Temple of Mars Ultor, flanked by two triumphal arches, and was intended to be an heroum filled with a gallery of statues of great Romans who had extended the boundaries of Roman power, the Forum of Nerva was dedicated to Minerva, and contained, besides her temple, the main thoroughfare of this part of the city, which fact gave it the name Forum Transitorium Finally, the Forum of Trajan had its own special basilica (*Basilica Ulpia*), it was entered through a colossal triumphal arch leading to the open square of the forum surrounded by a double colonnade, with the Emperor's equestrian statue in the centre, and flanked by a large hemicycle on each side Then came the Basilica Ulpia, also with two end hemicycles, and a double two-storied colonnade, the double Library with the Memorial Column in the intermediate area, and finally, the Temple of Trajan, erected by Hadrian. This forum established an adequate connection between the two sections of the city on either side of the Capitoline Hill As for the Roman Forum itself, its decoration was continued to the latest days of the Empire, many honorary statues being set up and buildings repaired during the fourth century Its appearance at that time, when it had been much enlarged over its original extent, was about as follows Backing against the Tabularium and Capitol at the western end of the Forum (which ran approximately from west to east), were the temples of Concord, of Vespasian, and the Colonnade of the Dii Consentes Farther east, towards the south side, the Temple of Saturn occupied the space between the ascent to the Capitol (Clivus Capitolinus) and the Vicus Jugarius Near it the Arch of Tiberius stood Across the Forum to the north was the Arch of Septimius Severus, with the Rostra Beyond (east of) the Arch of Severus were the political buildings, the Curia, or Senate House, and its annexes, on the Comitium The other buildings on the north side were the Temple of Janus, the Basilica Æmilia, the Temple of Antoninus and Faustina, the round Temple of Romulus, son of Maxentius, and the enormous Basilica of Constantine (See CONSTANTINE, BASILICA OF.) On the opposite (south) side were the great Basilica Julia, occupying the space between the Vicus Jugarius and the Vicus Tuscus,

and the Temple of Castor (Dioscuri)—one of the most exquisite works of Roman architecture Continuing eastward, we reach the primitive religious centre of this region, the Regia and the Shrine of Vesta with its famous atrium, opposite the Temple of Antoninus and Faustina and the Templum Urbis (See ANTONINUS AND FAUSTINA, TEMPLE OF, for the Atrium Vestæ, see VESTA) Here anciently stood the Arch of the Fabii, originally the entrance to the Via Sacra (See SACRED WAY) In the open space between the Temple of Castor and the Basilica Æmilia stood the Temple of Julius Cæsar, flanked on the south by a triumphal arch of Augustus

Later History. The topography and monuments of the Forum appear to have suffered but slight damage from the barbarian invasions of the fifth century, and it was not until the ninth century that its ruin was noticeable, accompanied by a rise in its level It was the fire of 1084, when Guiscard captured the city, which gave the old buildings their death blow, and buried them partly out of sight, the more conspicuous being occupied as feudal fortresses, and the level spaces turned into gardens. The Renaissance combined with its antiquarian curiosity a destructive vandalism which was more fatal to the Forum and the monuments surrounding it than any previous disasters, especially under Paul III (1534–49). The area became waste land, in which stood a few melancholy columns It was called the Campo Vaccino, or Cow Plain The destruction stopped only at the beginning of the nineteenth century under Pius VII and the antiquarian Fea, and excavations have been carried on almost continuously ever since then Those conducted by Lanciani and by Boni (since 1898) have been especially fruitful Consult the books by Lanciani and Hulsen-Carter, referred to below The progress of researches from year to year in the Forum is noticed in the article ARCHÆOLOGY in the NEW INTERNATIONAL YEAR BOOK of each year.

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FORUM In law, a court, or a place where legal jurisdiction is exercised It is used by Blackstone in the first sense, when he speaks of leaving a person to his "common remedy in *foro contentionis*"—in a court of litigation, i e, in an ordinary court of justice Judges sometimes refer to a domestic court as *forum domesticum* The term is used in a similar sense when an advocate is described as eminent or successful in the forum It is more frequently employed in the second sense, as a place of jurisdiction It bears this signification in Kent's commentaries "In respect to remedies," writes the Chancellor, "there are, properly speaking, three places of jurisdiction (1) the place of domicile of the defendant, commonly called the *forum domicilii*, (2) the place where the thing in controversy is situate, commonly called the *forum rei sitæ*; (3) the place where the contract is made, or the act done, commonly called the *forum rei gestæ* or the *forum contractus*" When it is said that a question is to be determined by the *lex fori*, it is meant that the decision is to be in accordance with the law of the jurisdiction within which the action is brought (See CONFLICT OF LAWS) The employment of the term in these and similar significations is due to the fact that Roman courts of justice were held in or near the Forum Consult Forsyth, *Hortensius the Advocate*, chap iii (Jersey City, 1881).

FORUM ALIENI. See FERRARA

FO'RUM AP'PII. A town on the famous Appian Way (q v), the modern Foro Appio, 43 Roman miles from Rome Here a canal began which ran southward parallel with the Appian Way to within a short distance of Terracina. Horace (*Satires*, i, 2 et seq) has an amusing description of the place as "abounding in boatmen and wretched inns" Here travelers might, if they preferred, change from the road to the canal boat This was Horace's choice, much to his discomfort At this place Paul, on his journey to Rome, being met by brethren of the Roman church, "thanked God and took courage" (Acts xxviii 15)

FORUM AUGUSTUM See FORUM, AUGUSTUS FORUM OF

FORUM BOA'RIUM The ancient cattle market of Rome, situated between the Velabrum and the Tiber, it was one of the busiest quarters of ancient Rome In it, near the Tiber, stands an elegant circular temple, popularly, but erroneously, called the Temple of Vesta See FORTUNE, TEMPLE OF, FORUM Consult Platner, *The Topography and Monuments of Ancient Rome* (2d ed, Boston, 1911)

FORUM CORNELII. See IMOLA

FORUM HOL'ITO'RIUM, or **OL'ITO'RIUM** (Lat, vegetable market) The vegetable market of Rome, adjoining the Forum Boarium, north of the piece of the Servian Wall which ran from the Capitoline Hill to the Tiber The space contained several temples, of which some remains are preserved Consult Platner, *The Topography and Monuments of Ancient Rome* (2d ed, Boston, 1911).

FORUM JULII See FRÉJUS, FRIULI

FORUM JU'LIUM, or **FORUM OF CÆSAR** The first of the five Imperial fora at Rome It was built by Cæsar from the spoils of the Gallic war, on ground to the northeast of the Forum Romanum, for which $4,000,000, it is said, was paid It was surrounded by arcades and a wall and contained the magnificent Temple of Venus Genetrix Nothing now remains of

its buildings but some half-buried arches and a part of the inclosure wall Consult Platner, *The Topography and Monuments of Ancient Rome* (2d ed, Boston, 1911) See FORUM

FORUM LIVII. See FORLÌ, FORUM

FORUM MAGNUM See FORUM

FORUM MARTIS See AUGUSTUS, FORUM OF, FORUM

FORUM OF AUGUSTUS. See AUGUSTUS, FORUM OF, FORUM

FORUM OF CÆSAR See FORUM JULIUM

FORUM OF NERVA See NERVA, FORUM OF, FORUM

FORUM OF TRAJAN See TRAJAN, FORUM OF, FORUM

FORUM OF VESPASIAN See FORUM PACIS

FORUM PA'CIS (Lat, Forum of Peace), or **FORUM OF VESPA'SIAN** The third of the Imperial fora at Rome, built in 71–75 A D to inclose Vespasian's Temple of Peace, called by Pliny the Elder one of the three most magnificent buildings in Rome In it were dedicated the spoils taken from Jerusalem. There are no remains of the temple. This forum was separated from the Forum of Augustus by a wide street leading from the Subura to the Forum Romanum This strip later became the Forum Transitorium of Nerva Consult Platner, *The Topography and Monuments of Ancient Rome* (2d ed, Boston, 1911) See FORUM, NERVA, FORUM OF

FORUM ROMA'NUM See FORUM

FORUM SEMPRONII See FOSSOMBRONE

FORUM TRAN'SITO'RIUM See NERVA, FORUM OF

FOR'WARD, WALTER (1786–1852) An American lawyer and cabinet officer, born in Hartford Co, Conn In 1803 he removed to Pittsburgh, Pa, where for some time he edited a Democratic newspaper, the *Tree of Liberty* He studied law, and was admitted to the bar in 1806 In 1822 he was elected to Congress as a Democrat, to fill a vacancy, and in 1823 began a full term He supported John Quincy Adams for the presidency, and became a Whig He was a leading member of the Protectionist Convention at Harrisburg in 1827, was active in the Pennsylvania Constitutional Convention in 1837, and in 1841 was appointed by President Harrison First Comptroller of the Treasury After the death of Harrison and the subsequent resignation of his cabinet, Forward was appointed Secretary of the Treasury by President Tyler, in September, 1841, but as Tyler broke away more and more from the Whigs, his position became more difficult, and finally, in March, 1843, he resigned From 1843 to 1849 he practiced law in Pittsburgh, from 1849 to 1851 was chargé d'affaires at Copenhagen, Denmark, and from 1851 to his death was president judge of the Allegheny County District Court

FOR'WARDING The business of receiving and transmitting goods for another The forwarding merchant assumes the expense of transportation and receives compensation from the owner Such a person is not deemed a common carrier, but is merely a warehouseman or agent and is required only to use ordinary diligence in sending the property by responsible persons and to obey the instructions of his principal Forwarding merchants have in the United States been superseded largely by express companies Common carriers often act as forwarders of goods from points on their own line to other places A person who holds himself out as a public forwarder is under a legal duty to receive and forward all goods tendered to him by any person for a reasonable compensation, unless he can show a valid excuse for his refusal or failure so to do See CARRIER, COMMON

FOSCARI, fōs'ka-rē, FRANCESCO (1373–1457) Doge of Venice from 1423 to 1457 Previous to his election he had been a Chief of the Forty, a Chief of the Ten, Inquisitor of the Ten, and Avogedar of the Commune He was always an advocate of an aggressive policy on the Italian mainland, for the purposes of territorial aggrandizement, and he was elected to the Dogate as an exponent of such a policy He soon entered upon a course of conquest, which continued, with intervals of peace, for nearly 30 years, and which in spite of many defeats resulted in the reduction of a large part of northern Italy under Venetian rule In 1426–27, in league with Florence, Naples, Savoy, and many minor principalities, he carried on a conflict with the Visconti of Milan As a result, Venice acquired the towns of Bergamo, Cremona, and Brescia War broke out again in 1431, the Venetian forces suffered defeat, but in the treaty of peace the territories of the Republic were nevertheless extended to the Adda Two years later hostilities were recommenced, this time Venice, Florence, Genoa, and the Pope were arrayed against Milan, Mantua, and Naples, and by the Peace signed in 1441 Venice gained possession of Peschiera and other places Hostilities were finally terminated by the Peace of Lodi in 1454 In spite of his uniform success in Italy Foscari was forced to meet bitter opposition at home This was based mainly on the fact that, owing to the Italian wars, the influence of Venice had suffered greatly at the hands of the Turks in Greece and in the Grecian Archipelago His life was also embittered by the misdeeds of his youngest son, Giacopo, who, with the father, forms the subject of Byron's tragedy *The Two Foscari* In 1445 Giacopo was denounced for having received bribes in order to use his influence in the disposal of state offices He was tried by the Council of Ten and banished, but in 1447, on the Doge's petition, he was allowed to return, and he lived quietly at Venice for three years In 1450 one of the Council of Ten was murdered, and suspicion fell upon Giacopo, who in the following year was tried, tortured, and banished to Candia, the Doge taking no part in the trial There was great doubt about Giacopo's guilt, but he seems to have engaged in treasonable correspondence, for which he was again tried in 1456 and again banished There was still so much uncertainty about his guilt that there was a movement to recall him when his death was announced, in 1457 Foscari, worn out and broken-hearted, was soon after deposed illegally by the Council of Ten, through the machinations of his enemy, the Admiral Giacopo Loredano, who had been one of the chief instigators of the action against the younger Foscari He resisted at first, but yielded to force, and left the Doge's palace on Oct 24, 1457 He died on November 1 Consult Romanin, *Storia Documentata di Venezia*, vol iv (Venice, 1855), Hazlitt, *The Venetian Republic* (2 vols, London, 1900), Brown, *Venice* (New York, 1893)

FOSCOLO, fōs'kō-lō, UGO (1778–1827) An Italian writer, born at Zante, in the Ionian Isles, the son of a Venetian family then settled

there Originally called Niccolò, he early changed his name to Ugo Part of his childhood was spent in Dalmatia with his father, a physician, when he died, Ugo returned to Zante, whence, probably in 1793, he went to Venice He continued his education in this city, feeding on the writings of the French philosophers, inflaming his patriotism with Alfieri's tragedies, and making occasional visits to the University of Padua, where he came under the influence of M Cesarotti At this time began the multitudinous love affairs which marked the course of his life Among his verses of this period is the poem *La Giustizia e la pietà*, in imitation of Young's gloomy sentimentality Soon after appeared the odes, *A Luigia Pallavicini* and *All' amica risanata*, of remarkable beauty of form and sincere classic feeling While these show the influence of his friend Parini the sonnets (1800–02), some of the most perfect in the language, suggest Alfieri Taking an active part in the political discussions which followed the fall of the Venetian Republic, he addressed an ode to Napoleon, expecting him to establish a free government in its stead Embittered by Napoleon's transfer of Venice to Austria, he wrote the *Letters of Jacopo Ortis* (1798), a sort of political *Werther* who succumbs to the sufferings of his disillusioned patriotism Relieved by this expression of his feeling, with renewed hope in Napoleon he served with the Italian division of the French army from 1804 to 1806 and spent some time at Boulogne-sur-Mer, which was later useful to him when he translated Sterne's *Sentimental Journey* In 1807 appeared *I Sepolcri*, in many respects his masterpiece, a magnificent attempt to find "refuge in the past from the misery of the present" In splendid lyrical passages it extols burial monuments as incentives to virtue and good deeds in their recall to the living of the mighty dead. He was appointed to the chair of eloquence at the University of Pavia in 1808 His inaugural discourse, "Dell' origine e dell' uffizio della letteratura," in which he passionately appealed to his young countrymen to study literature in its relation to national life and growth, produced a sensation, resulting in Napoleon's suppression of this chair in all Italian universities His classical tragedy, the *Ajace*, performed at Milan in 1811, contained allusions to Napoleon, and the author was obliged to leave Milan He went to Florence, where he wrote another tragedy, *Ricciarda*, and began the *Hymn to the Grave*, dedicated to Canova, in which he wished to embody all metaphysical conceptions of the beautiful He never completed it In 1813, when Napoleon's power declined, he returned to Milan, only to leave the city again when the Austrians regained control of it and his patriotic sentiments prevented him from taking the oath of allegiance to the foreigner Self-exiled, he went to Switzerland and then to England, where he was enthusiastically received as a type of fearless patriot He lived at Kensington, in London, burdening himself to such an extent with debts by his lavishness that he was for a while imprisoned He was rescued from poverty and misery by his friend, Hudson Gurney, and died at Turnham Green His remains were interred at Chiswick In 1871 the Italian government had them transferred to Florence, where with many honors they were buried in the church of Santa Croce

Foscolo is also a conspicuous figure in criticism He was the first among the Italians to consider a work of art as a psychological phenomenon, with its causes in the mind of its author and in the characteristics of the century in which it was produced For an edition of Boccaccio's works (London, 1825) he wrote as a preface his *Discorso storico sul testo del Decamerone*, and for an edition of Dante's great poem he prepared an essay, *Sul testo della Commedia di Dante* (Brussels and London, 1842), which is a treatise of importance in the history of Dante studies He also contributed articles to English magazines Many of his letters are printed in the *Epistolaria*, in the edition of his works published at Florence (1850–62), others have been edited by Tobler (Leipzig, 1871) He is revered by his country as a great poet, but he was, besides, in spite of many faults and fluctuating fortunes, a true patriot

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FOS'DICK, Charles Austin (pen name, "Harry Castlemon") (1842–1915) An American writer of juveniles He was born at Randolph, N Y, was educated at the Central High School of Buffalo, N Y, and served in the Civil War He is author of more than 50 books of adventure for boys, including *Frank on the Lower Mississippi* (1869), *The Buried Treasure* (1877), *The Boy Trapper* (1878), *George at the Fort* (1882), *Don Gordon's Shooting-Box* (1883), *Oscar in Africa* (1894), *Elam Storm, the Wolfer* (1895), *Carl the Trailer* (1900), *Floating Treasure* (1901), *Frank Nelson in the Forecastle* (1904), *Snowed Up* (1904)

FOSDICK, James William (1858–) An American mural painter, craftsman, and writer on art He was born at Charlestown, Mass, and studied art first at the school of the Boston Museum, later he was able to go to Paris, where at the Académie Julian he had as teachers Boulanger, Lefebvre, and Collin Mural painting and pyrography (q v) came to be his special interests After his return to America the latter received much of his attention—he was among the first to give thorough study to this still only partly developed art He decorated important private residences (Gould, Havemeyer, Lewisohn, etc) in New York (where he established himself), and elsewhere Among his works one of the most important is "The Adoration of St Joan of Arc," in the National Gallery, Washington, others are a "Decorative Portrait of Louis XIV" in the Pennsylvania Academy of Fine Arts, and "Arethusa" (1912) In 1890 he was made a member of the New York Architectural League, and later of the Society of Mural Painters (of which he became secretary), and the Copley Society

FOSS, Cyrus David (1834–1910). An American Methodist Episcopal bishop He was born

at Kingston, N Y, graduated at Wesleyan University in 1854, and entered the itinerant ministry of the Methodist Episcopal church, in the New York Conference, in 1857 From 1857 to 1859 he was a pastor at Chester, Orange Co, N Y, from 1859 to 1865 in Brooklyn, and from 1865 to 1875 in New York City He was president of Wesleyan University from 1875 to 1880, when he was elected a bishop In 1878 he was delegate to the General Conference of the Methodist Episcopal Church South, in Atlanta, Ga, and in 1886 to the British Wesleyan Conference, in London He made tours of the missions of his church in Europe (1886), Mexico (1893), and India and Malaysia (1897–98), and wrote *From the Himalayas to the Equator* (1899), *Religious Certainties* (1905), and *Temperance and the Pulpit* (1910) Consult *Cyrus David Foss A Memorial* (Philadelphia, 1910)

FOSS, EUGENE NOBLE (1858–) An American manufacturer and public official He was born at West Berkshire, Vt, and was educated at the university of that State Engaging in manufacturing in Boston in 1882, he became treasurer and general manager of B F Sturtevant & Co, president of the Becker Milling Machine Company, the Mead-Morrison Manufacturing Company, the Burgess Mills, and the Maverick Mills, and a director in many other corporations In 1902 he began the advocacy of tariff reform and reciprocity, in 1910 he was elected to Congress on the Democratic ticket, and from 1910 to 1913 he was Governor of Massachusetts During his last year of office he aroused the hostility of the labor unions, and this was instrumental in defeating his candidacy for a fourth term

FOSS, SAM WALTER (1858–1911) An American journalist and writer of humorous verse He was born at Candia, N H, and graduated from Brown University in 1882 He was editor of the *Saturday Union* in 1883–87 and the *Yankee Blade* in 1887–95 at Lynn, Mass, and from 1888 to 1895 he was also editorial writer for the Boston *Globe*. In 1898 he became librarian of the Somerville Public Library He frequently gave lectures and readings of his own poems, the volumes of his verse including. *Back Country Poems* (1894), *Whiffs from Wild Meadows* (1896), *Dreams in Homespun* (1898), *Songs of War and Peace* (1899), *Songs of the Average Man* (1907)

FOS'SA, or **FOUS'SA** (Malagasy) The largest carnivorous mammal of Madagascar, a slender, lithe creature, connecting the cats and civets and in structure partaking of both It is about twice the size of a house cat and has a very long, tapering tail, so that it measures fully 5 feet from tip of nose to end of tail It is nearly uniformly pale brown in color, with the hair short and close and no spots Each foot has five catlike toes, the claws of which are sharp, curved, and retractile, but the soles of the hind feet are entirely naked and rest upon the ground in walking. The dentition is a mixture of forms characterizing both the cats and the civets, the teeth numbering 36 in all A separate family has been proposed for this strange carnivore by several zoologists, but it seems best to regard it as alone representing a group Cryptoproctinæ within the civet family (Viverridæ), under the name *Cryptoprocta ferox*. It seems to be confined to Madagascar, where it is not numerous, and although much dreaded by the natives, on account of its reputation for ferocity and ability to do harm, is rarely seen, since it is wholly nocturnal It feeds upon small animals and birds and occasionally invades poultry yards, but its general habits are little known

FOSSA DRUSIANA See DRUSUS, 3, GERMANIA.

FOS'SA MA'RIA'NA (Lat, trench of Marius) The canal made 102 B C, by Marius, from the Rhone to the Gulf of Stomalimne, near the modern village of Foz (*Fossæ Marianæ*) It was constructed to avoid the difficult navigation at the mouths of the river, caused by the accumulations of sand by the several streams It was about 16 miles long and was later given to the inhabitants of Massilia (Marseilles), who derived large revenues from it

FOSSANO, fōs-sa'nō A city in the Province of Cuneo, north Italy, 1235 feet above sea level, on the left bank of the Stura, 40 miles south of Turin, 15 miles northeast of Cuneo (Map· Italy, A 2) The name "Fossano" is derived from the Latin *Fons Sana* (Healthful Spring) The city has promenades on the site of the old walls, a fourteenth-century castle, a cathedral, a seminary, a gymnasium, a veterinary school, two houses of correction, and an academy of science It manufactures silk fabrics, gunpowder, leather, paper, and baskets Fossano was purchased by the house of Savoy in 1340, was the residence in the sixteenth century of Philibert Emmanuel and several of his successors, and in 1796 and 1799 was the scene of battles between the French and the Austrians Pop (commune), 1901, 18,133, 1911, 18,731

FOSSANO, AMBROGIO See BORGOGNONE

FOSSE See FOSSWAY

FOSSE, CHARLES DE LA. See LA FOSSE, CHARLES DE

FOS'SIL (Fr *fossile*, from Lat *fossilis*, dug up, fossil, from *fodere*, to dig, connected with Corn *bedh*, Welsh *bedd*, grave, OChurch Slav *bosti*, Lith *badyti*, to pierce) Any remains or trace of the form of animals or plants found buried by natural causes in deposits or rocks before the present era The term was formerly applied to anything dug up out of the ground and included minerals, prehistoric implements, etc At the present day the word is used as an adjective in this latter sense, and also to designate anything pertaining to prehistoric times Thus, we read of fossil salt, fossil raindrops and mud cracks, and fossil lakes, deserts, seabeaches, and shores The word "petrifaction" is often incorrectly employed as a synonym for "fossil," although it properly designates only such organic remains as have been turned to stone, as described below Fossils are the relics of the animals and plants that have lived upon the earth and in the waters of the earth during the long periods of its geological history, and study of their organization, occurrence, and relations to each other and to modern organisms constitutes the science of paleontology (q v) Fossils are naturally absent from all rocks of igneous and volcanic origin and, on the other hand, they are present originally in nearly all rocks of sedimentary origin From large masses of these latter they have been obliterated by chemical and physical changes, so that they are now seldom or sparingly found in metamorphic rocks The processes by which organic remains have been preserved are grouped under the term "fossilization" This includes entombment and the subsequent changes that have ensued. The

place of entombment may be on land, in fresh water, or in the salt water of bays, seas, or oceans

The degree of preservation of fossils varies greatly In some few cases the flesh of animals has been preserved as if in an ice box Mammoth carcasses embedded in the frozen mud cliffs of Siberia for thousands of years had meat so fresh that it was eaten by the dogs of the exploring party The most perfectly preserved fossils are undoubtedly those insects found in the Tertiary amber of the Baltic provinces, where the form, structure, and colors are retained intact Then we find shells preserved in the rocks with their original organic matter replaced by some mineral, usually silica, or perhaps barite, pyrites, or even zinc blende Such replacements rightly receive the name of "petrifactions" In other cases we find cavities in rocks, the sides of these retaining impressions of the outer and inner surfaces of shells which have been dissolved and destroyed by percolating waters These "molds" are sometimes filled with calcite, or quartz, or other mineral matter, and then we have "casts" of the original organic forms The study of these molds is puzzling to the beginner, because of the multiplication of forms so caused A single shell like a limpet, if preserved in the rocks, may present four different aspects as a fossil—the outer and inner surfaces of the shell itself, and the molds of each of these The mold of the outer surface may pull away such delicate spines as may ornament the shell, and for this reason molds should always be carefully collected and treated with acid, after which the impression of the original shell surface is often shown with the utmost fidelity to detail Another class of fossils consists of the impressions or trails made by animals crawling over the bottom of the water or over the beach, and also of burrows or casts of burrows that served as dwelling places or passageways for worms, crustaceans, etc The study of the footprints of reptiles and supposed birds, which are so abundant on the surfaces of the Jurassic sandstones of Massachusetts and Connecticut, was named "ichnology" by E Hitchcock, who described and figured a host of such impressions (See ICHNOLOGY) Similar footprints are found in rocks of shallow-water origin of Mesozoic and Tertiary age all over the world.

The parts of animals likely to be preserved are always those that resist longest the destructive agencies that may attack them both before and after their entombment The soft parts are seldom preserved, and often also the hard parts are destroyed Because of this certain groups of animals are represented by insignificant parts of their anatomy, which, though of great importance to the paleontologist, are usually laid aside by the zoologist as of trivial interest Thus, the presence of sponges in certain formations is demonstrated by their isolated spicules, holothurians are recognized by their minute calcareous plates and anchors, worms by their teeth and dwelling tubes, dibranchiate cephalopods by their internal shells, and many fish by their teeth, ear bones (otoliths), spines, and dermal scales

The manner of entombment of fossils varies greatly In many cases the shells of mollusks have been dead a long time and have become incrusted with polyzoans and corals before they were entombed In other cases they were washed along the shore and broken and worn by the waves so that now in fragmentary condition they form "shell limestones Among the crustacean fossils we find those that were killed suddenly, perhaps by some change in the temperature of the water, in which case their remains are usually well preserved In some rocks of fresh-water or estuarine origin certain layers are covered with the remains of fish These evidently lived in shallow pools that were either dried up suddenly or became so heated by the sun that the fish were killed, soon to be covered by sediment Such conditions are frequent in the Catskill, Old Red Sandstone, and Jurassic formations Myriads of insects of Tertiary time became entangled in the soft gum of coniferous trees and are now preserved in the amber of the Baltic and the fossil resins of Africa and New Zealand

The old ideas regarding fossils were curious and often fantastic A few of the Greek and Roman philosophers had well-defined ideas of their true nature as entombed animals and plants that had once lived in the sea and upon the earth, but the majority of early writers attached to them some fanciful or supernatural origin Thus they were explained as due to the *vis plastica*, or creative force that formed living things out of inorganic materials, as sports of nature, as due to some peculiar fermentative process in the earth, or as originating in some unknown influence of the stars Another hypothesis, maintained for centuries and even now persisting in uneducated communities, explains fossils as the remains of animals and plants washed up on the land and there stranded by the waters of the Noachian deluge These erroneous ideas persisted in the face of true explanations by some observers until the beginning of 1800, when slowly the true nature of fossils and their relations to the rocks in which they are entombed began to be more universally understood, and at last during 1800 to 1840 there were laid the foundations of the science of paleontology

For further information on the early ideas regarding fossils, consult Lyell, *Principles of Geology*, vol i (New York, 1872), and Von Zittel, *History of Geology and Palæontology*, translated by Ogilvie-Gordon (ib, 1901) For modes of fossilization and the relations between fossils and the rocks containing them, consult Geikie, *Text-Book of Geology* (London, 1903) White, "The Relations of Biology to Geological Investigation," in *Smithsonian Institution Report of the United States National Museum for 1892* (Washington, 1894), Marr, *Principles of Stratigraphical Geology* (Cambridge, 1898), Schuchert, "Directions for Collecting and Preparing Fossils" in *Smithsonian Institution United States National Museum, Bulletin No 39* (Washington, 1895), Hartzell, "Conditions of Fossilization," in *Journal of Geology*, vol xiv (Chicago, 1906), Schuchert, "Fossils for Stratigraphic Purposes," in *Economic Geology*, vol viii (Lancaster, Pa, 1913) See also PALEONTOLOGY, PALEOBOTANY, GEOLOGY

FOSSIL BIRD See BIRD, FOSSIL

FOSSIL BOTANY See PALEOBOTANY.

FOSSIL FOOTPRINTS See ICHNOLOGY

FOSSIL FORESTS. The popular term applied to groups of petrified tree trunks Such forests may be found at the locality and in the position in which they grew, or, what is more frequently the case, they may have been carried some distance from their native soil before being

buried and silicified Fossil trees are not uncommon in the coal measures of the United States, but the most celebrated examples, belonging to more recent geological periods, are those of Arizona and the Yellowstone Park Along the Little Colorado River, in Arizona, there are great numbers of well-preserved trees, scattered over the surface, some of which attain a diameter of 5 feet and a length of more than 50 feet The wood cells have been replaced by silica, which is either colorless, like quartz, or shows the beautiful tints of agate, opal, and jasper, the structure of the wood is preserved to a most remarkable degree Heavy beds of Triassic marls cover the surface, and it is in this formation that the trees are found The silication was probably accomplished by hot alkaline waters, carrying dissolved silica, there is evidence of volcanic activity in the region which might well give rise to thermal springs Many of the trees have been removed for cutting and polishing into various artistic objects, rivaling onyx and the rarer marbles in delicacy of color, and this wholesale destruction has given much concern lest the forest be entirely destroyed A similar fossil forest in the Yellowstone valley has many erect stumps of large size Along the shore of Chesapeake Bay, south of Baltimore, is a forest in which the giant trunks of cypress rise from a bed of peat that is covered by Pleistocene clays The Bad Lands of the Little Missouri abound in petrified trees which have been washed out from shales and sandstones of the Laramie group Another forest, remarkable for the great size of its trees, is found in Napa Co, Cal In England fossil trees were laid bare at Parkfield Colliery, near Wolverhampton, in 1844 Within the space of one-fourth of an acre there were 73 stumps with attached roots, the trunks lying prostrate in every direction The wood was converted into coal Silesia, Egypt, and the island of Antigua, in the West Indies, also have fossil forests Consult Marsh, *American Journal of Science* (New Haven, 1871), Hague and others, "Geology of the Yellowstone National Park," *United States Geological Survey, Monograph 32* (Washington, 1899), Merrill, *Fossil Forests of Arizona* (Adamana, Ariz, 1911)

FOS'SILIF'EROUS ROCKS (from Lat *fossilis*, dug up, fossil + *ferre*, to bear) Rocks which contain organic remains If we except the lowest metamorphic rocks of the Algonkian system, in which, as yet, no undoubted fossils have been found, the term is equivalent to "stratified rocks" and "sedimentary rocks" when used comprehensively, but it may also be applied to a particular bed, barren of organic remains, as in case of an unfossiliferous sandstone compared with a neighboring fossiliferous shale or limestone

FOSSIL INVER'TEBRATES. See PALEONTOLOGY

FOSSIL MEAL. See DIATOMACEOUS EARTH.

FOSSIL PLANTS See PALEOBOTANY

FOSSIL VER'TEBRATES See PALEONTOLOGY

FOSSOMBRONE, fŏs'sōm-brō'nā A city in the Province of Pesaro e Urbino, central Italy, 44 miles northwest of Ancona by way of Fano (Map Italy, D 3) It is situated in the valley of the Metauro, on the ancient Via Flaminia, and 11 miles southeast of Urbino A noteworthy feature is its cathedral containing a fifteenth-century altar by Domenico Rosselli, the church of San Francisco has a lunette by the same artist The city has a gymnasium, technical schools, and important silk and oil industries In the vicinity (2 miles to the northeast at S Martino al Piano) are ruins of the Roman colony Forum Sempronii, which was destroyed by the Goths and the Lombards the hill of Pietralata, sometimes called Monte d'Asdrubale, where, according to tradition, the battle of the Metaurus took place in 207 B C (see HASDRUBAL, 3), and the Furlo Pass, a tunnel, 120 feet long, 17 feet wide, and 14 feet high, hewn through the solid rock, as the inscription at the northern entrance shows, by the Emperor Vespasian in 77 A D Pop. (commune), 1901, 10,428, 1911, 9701

FOSSOMBRONI, fŏs'sōm-brō'nē, VITTORIO, COUNT (1754–1844) An Italian statesman and scientist, born at Arezzo He studied at the University of Pisa, and after holding other offices in the Grand Duchy of Tuscany, became Minister of Foreign Affairs (1796) When Tuscany was converted into the Kingdom of Etruria (1801), he acted as Commissioner of Finance and proposed a scheme of monetary reform In 1805 he became lieutenant general of the Tuscan troops He was a senator of the Empire and president of a commission on sanitation in Rome and on draining the Pontine Marshes When the grand duchy was reestablished, in 1814, Fossombroni was made Prime Minister and President of the Legislature His main work was putting the Tuscan finances on a sound footing His published works are *Sur l'intensité de la lumiere* (1782), the very important *Memorie idrolico-storiche sopra le val di Chiana* (1789), *Sur l'équation conditionelle* (1794), *Sur le principe de la vélocité virtuelle* (1796), *Sur l'amélioration des marais Pontins* (1805)

FOSS'WAY, or **FOSSE,** THE A road in England, built by the Romans It ran probably from the seacoast at Seaton in Devonshire to Lincoln, with a continuation northward to the Humber, known as "High Street" The earliest mention of the Foss is in some Anglo-Saxon charters dating from the eighth century, and travelers along it enjoyed from early times the special protection known as the King's Peace This sanctity it enjoyed together with the other three so-called Roman ways Watling Street, Icknield Street, and Ermine Street The Foss was constructed early during the Roman occupation to facilitate the military control of the island It was still in good condition in the twelfth century, but has now almost disappeared Consult Guest, "The Four Roman Ways," in *Origines Celticæ* (London, 1883), and Codrington, *Roman Roads in Britain* (ib, 1903)

FOS'TER, ABBY KELLEY (1811–87) An American reformer, born of Quaker parentage, at Pelham, Mass After attending the Friends' School at Providence, R I, she taught for several years in Massachusetts In 1837 she delivered a series of lectures in favor of the abolition of slavery She was the first woman who had ever appeared before mixed audiences as an advocate of antislavery principles, and although she was the object of harsh criticism and was compelled to suffer indignities and rough treatment, her attempt met with considerable success In 1845 she married Stephen Symonds Foster (q v), the Abolitionist, with whom she lectured Afterward she advocated prohibition and woman's suffrage

FOSTER, Sir Augustus John (1780–1848) An English diplomat Through his mother's influence (she had married the Duke of Devonshire after the death of John Thomas Foster) he was made Secretary of the English Legation at Naples, and in 1811 was sent to the United States as Minister with definite instructions to settle the affair of the *Chesapeake* At the outbreak of the war he returned to England and was elected member of Parliament He was made Minister at Copenhagen in 1814, passed 10 uneventful years there, and in 1824 went to Turin, where he stayed until 1840 and then retired He committed suicide on Aug 1, 1848

FOSTER, Ben(jamin) (1852–1926). An American landscape painter, born at North Anson, Me He was a pupil of Abbott Thayer in New York City, and of Oliver Merson and Aimé Morot in Paris His art is founded on French methods and he is particularly successful with the misty effects of early morning and evening, and moonlight nights His "Mists of the Morning" (1901) obtained the Webb prize, and he received other medals, including the Inness gold medal of the National Academy of Design in 1908 He was elected to the National Academy in 1904 His "Lulled by the Murmur of a Brook" is in the Luxembourg Gallery Other important canvases are "Sunset in the Litchfield Hills," Corcoran Art Gallery, Washington, "Birch Clad Hills," National Gallery, Washington, "Misty Moonlight Night," Brooklyn Institute Museum, 'In the Connecticut Hills" (1914), Metropolitan Museum, New York He is also represented in the Pennsylvania Academy, Philadelphia, and the Toledo Museum

FOSTER, Charles (1828–1904) An American Republican politician and Secretary of the Treasury He was born near Tiffin, Ohio He was educated at Norwalk Academy and entered his father's store (in Fostoria, a town named in honor of his father), becoming a partner and finally succeeding to the control of the business, which under his efficient management became one of the largest retail and wholesale mercantile establishments in the State In connection with this business he established a bank and dealt largely in grain and produce During the Civil War he actively aided in the recruiting and equipment of the Ohio troops Elected to Congress on the Republican ticket in 1870, he was reelected in 1872, 1874, and 1876 In the winter of 1874–75 he visited New Orleans as chairman of the subcommittee of Congress to examine into frauds in Louisiana. In 1879 he was elected Governor of Ohio by 17,000 majority, and two years later, in 1881, was reelected, serving until Jan 1, 1884 His administration was marked by reforms in the management of State institutions and by an attempt to reform the taxation of the liquor traffic In 1889 Foster was appointed by President Harrison chairman of a commission to draw up a treaty with the Sioux Indians In February, 1891, he succeeded William Windom as Secretary of the Treasury in Harrison's cabinet and this portfolio he held until March, 1893

FOSTER, Sir Clement le Neve (1841–1904) A British mineralogist, born at Camberwell He studied at Boulogne and Amiens, attended the Royal School of Mines, London, and the mining academy at Freiberg, Saxony, and graduated from the University of London in 1865 Appointed to the Geological Survey in England in 1860, he spent five years in field work After exploring Egypt and Venezuela, and serving as a mining engineer in Italy, he was inspector of mines for Cornwall from 1872 to 1880 and for north Wales from then until 1901 In the Royal School of Mines he was professor of mining from 1890 until his death He was elected a fellow of the Royal Society in 1892 and was knighted in 1903 Besides memoirs and papers, he is author of *A Treatise on Ore and Stone Mining* (1894, 7th ed, 1910) and *The Elements of Mining and Quarrying* (1903, 2d ed, 1910)

FOSTER, Frank Hugh (1851–). An American clergyman of the Congregational church He was born in Springfield, Mass, graduated at Harvard in 1873, from 1873 to 1874 was assistant professor of mathematics in the United States Naval Academy, and in 1877 graduated at Andover Theological Seminary and was ordained to the Congregational ministry In 1877–79 he was pastor at North Reading, Mass, in 1879–82 studied at Gottingen and Leipzig, and from 1882 to 1884 was professor of philosophy in Middlebury College In 1884 he was appointed professor of Church history in the Oberlin Theological Seminary, and from 1892 to 1902 he was professor of systematic theology in the Pacific Seminary, Berkeley, Cal In 1904 he went to Olivet, Mich, as pastor of the college and the village church He was an editor of the *Bibliotheca Sacra,* translated Grotius' *Defense* (1889), wrote *Christian Life and Theology* (1900), *A Genetic History of the New England Theology* (1907), and the chapter on Zwingli's theology in Jackson's biography of Zwingli (1901)

FOSTER, George Burman (1858–) An American Baptist theologian, born at Alderson, W Va He graduated in 1883 at West Virginia University and at the Rochester (N Y) Theological Seminary in 1887, and was pastor of the First Baptist Church of Saratoga Springs, N Y, from 1887 to 1891 In 1891–92 he studied in Germany, from 1892 to 1895 he was professor of philosophy in McMaster University, and in 1895 he became professor of systematic theology in the University of Chicago and in 1905 professor of the philosophy of religion He wrote *The Finality of the Christian Religion* (1906) and *The Function of Religion in Man's Struggle for Existence* (1909)

FOSTER, Sir George Eulas (1847–1919) A Canadian statesman He was born in Carleton Co, New Brunswick, and graduated at the University of New Brunswick in 1868, afterward studying in the universities of Edinburgh and Heidelberg After several years of schoolteaching he was appointed professor of classics and history in the University of New Brunswick He resigned his professorship in 1879, and after two years spent in lecturing on temperance problems in Canada and the United States, he entered politics and was returned in 1882 to the Dominion House of Commons as a Liberal-Conservative from Kings Co, New Brunswick His scholarship and his readiness and resourcefulness as a speaker and debater won him early recognition, and in December, 1885, he entered Sir John A Macdonald's cabinet as Minister of Marine and Fisheries In this office he was called upon to prepare the case for Canada to be presented to the joint commission in Washington which had been appointed to settle the long-standing dispute over the

deep-sea fisheries His brief for Canada was an able presentation and left its impress on the Bayard-Chamberlain Treaty of 1888 In May, 1888, he became Minister of Finance and continued to hold this portfolio in the succeeding cabinets of Sir J J C Abbott, Sir John Thompson, Sir Mackenzie Bowell, and Sir Charles Tupper, until the defeat of the last named in 1896 In 1896–1900 he represented York Co, New Brunswick, in the House of Commons, and after 1904 he sat for north Toronto He was a delegate to the first Intercolonial Conference at Ottawa in 1892 and in 1895 supported a resolution in the House of Commons for the extension of the Dominion franchise to women. In 1903 he delivered a series of public speeches in England in support of Imperial trade preference In 1911, after the defeat of the Laurier administration and the accession to the premiership of Robert Laird Borden, Foster was appointed Minister of Trade and Commerce He afterward visited the West Indies in the interest of improved trade between Canada and those islands In 1914 he was knighted.

FOSTER, Henry (1796–1831). An English navigator He entered the navy in 1812, accompanied the commission on the northwest boundary between the United States and British North America, and made surveys of the mouth of the Columbia In 1819–20 he sailed to South America and began his important observations with the pendulum He was a member of the expedition to Greenland and Norway in 1823 and in the following year and again in 1827 sailed with Parry on his northwestern and polar voyages The results of his observations on the variation of the needle were printed in the *Philosophical Transactions* (1826), and he received the Copley medal and the grade of commander for this work In 1828 he started for the South Seas to make pendulum observations and to study ocean currents and meteorology. He rounded Cape Horn after observations near Montevideo, touched on the South Shetland Islands, where he made important gravity and pendulum observations, and after much cruising landed at Panama, and measured by rockets the meridian distance between Panama and Chagres. He was drowned in the river Chagres a day or so after His observations on the figure of the earth, made at 16 stations, were completed in London by Baily Foster's notebook was stolen, but his other papers were published by Webster in a *Narrative of a Voyage to the Southern Atlantic Ocean* (1834)

FOSTER, Isaac (1740–81). An American physician and surgeon, born in Charlestown, Mass He graduated at Harvard in 1758, studied medicine in Paris and London, and returned to practice at Charlestown He was a delegate to the first Provincial Congress of Massachusetts in October, 1774, and on the outbreak of the Revolution gave up his large practice and joined the Continental Army as a volunteer surgeon In the fall of 1775 he was appointed by Washington acting director general of the military hospital service of the American forces He was personally attached to Washington's headquarters and in 1777 was surgeon in chief of the Eastern Department of the Continental armies He resigned in 1780 on account of failing health

FOSTER, John (1770–1843). An English essayist, son of a weaver, born in the parish of Halifax, Yorkshire, and educated for the ministry at the Baptist college in Bristol After preaching for several years to small congregations, he resolved to devote himself mainly to literature In 1804 appeared his popular *Essays, in a Series of Letters*, in 1820 his celebrated *Essay on the Evils of Popular Ignorance*, in which he urges the necessity of a national system of education To the *Eclectic Review* he contributed nearly 200 articles Consult *Life and Correspondence*, edited by Ryland (London, 1846, republished in Bohn's Library, 1852)

FOSTER, John Gray (1823–74) An American soldier, born at Whitefield, N H He graduated at West Point in 1846 with McClellan and "Stonewall" Jackson, and served in the southern campaign of the Mexican War, being severely wounded at Molino del Rey From 1855 to 1857 he was assistant professor of engineering at West Point and between 1857 and 1861 superintended the survey of the site of the fort at Willets Point, N Y, and the construction of Fort Sumter and the repairing of Fort Moultrie in Charleston harbor On Dec 26 1860, he was brevetted major for transferring the Federal garrison from Fort Moultrie to Fort Sumter, and on April 12–13, 1861, he assisted in the defense of Sumter He superintended the construction of the fort on Sandy Hook, N J, was raised to the rank of brigadier general of volunteers in October, 1861, and commanded a brigade during General Burnside's North Carolina expedition of January to July, 1862, receiving the brevet of colonel He became a major general of volunteers in July, 1862, and commanded the Department of North Carolina until July, 1863, the Department of Virginia and North Carolina until November, 1863, and the Army and Department of the Ohio until February, 1864, and was brevetted brigadier general and major general in the regular army. He commanded the Department of the South and the Department of Florida in 1864–66, was mustered out of the volunteer service in September, 1866, and then as lieutenant colonel of engineers was on various important engineering works for the government, notably the improvement of Boston harbor and the construction of the defenses in Portsmouth harbor Consult the sketch of his life by Noyes in *New Hampshire Historical Society, Proceedings*, vol iii (Concord, 1894–95)

FOSTER, John Watson (1836–1917) An American diplomat, born in Pike Co, Ind In 1855 he graduated at Indiana State University and in 1857 was admitted to the bar At the beginning of the Civil War he entered the Union service as a major of volunteers, and after attaining the rank of colonel headed a brigade in General Burnside's expedition to East Tennessee and was the first to occupy Knoxville (1863) In Evansville, Ind, he edited the *Daily Journal* in 1865–69 and was postmaster in 1869–73 In 1873–80 he was Minister to Mexico, in 1880–81 Minister to Russia, and in 1883–85 Minister to Spain In 1891 he was engaged to assist President Harrison and Secretary Blaine in the negotiation of reciprocity treaties During the Bering Sea controversy he acted as agent of the United States before the arbitration tribunal (1893) Upon the death of Mr Blaine General Foster succeeded to the secretaryship of state (1892–93) Later he was legal adviser to the Chinese plenipotentiaries in their peace negotiations with Japan (1895); again represented the United States in the Bering Sea ques-

tion (1897), in 1898 was a member of the Anglo-American Joint High Commission to settle the disputes between Canada and the United States, in 1903 was agent for the United States before the Alaska boundary commission, and in 1907 was delegate from China to the Second Hague Conference He published a biography of his father, Judge Matthew Watson Foster (1896), *A Century of American Diplomacy* (1900), *American Diplomacy in the Orient* (1903), *Arbitration and The Hague Court* (1904), *The Practice of Diplomacy* (1906), *Diplomatic Memoirs* (1909) He contributed an introduction to Mannix's *Memoirs of Li Hung Chang* (1913)

FOSTER, JOHN WELLS (1815–73) An American geologist and paleontologist, born at Brimfield, Mass He graduated at Wesleyan University (Conn) in 1834, removed to Ohio, studied law, and was admitted to the bar at Zanesville, but having spent his leisure in the study of geology, he accepted a position as assistant in the Geological Survey of Ohio in 1837, and was employed until 1844 in investigating the coal beds of the State In 1847 he was assigned with Josiah Dwight Whitney to assist Prof Charles T Jackson in a geological survey of the Lake Superior region Foster and Whitney completed the work alone, and the results of their investigations, which were of far-reaching importance both to science and to the commercial development of the country, were published by authority of Congress as *A Synopsis of the Explorations of the Geological Corps in the Lake Superior Land District in the Northern Peninsula* (1849), and *Report on the Geology and Topography of a Portion of the Lake Superior Land District in the State of Michigan Part I, The Copper Lands* (1850), *Part II, The Iron Region* (1851) For the next few years Foster remained in Massachusetts, where he was active in the "Native American" movement and was associated with Henry Wilson in the organization of the Republican party in the State In 1858 he removed to Chicago, where he lived for the remainder of his life, for some years holding the chair of natural philosophy in the old University of Chicago and devoting himself to scientific investigation, in particular to the paleontology and ethnology of the Mississippi valley He was president of the American Association for the Advancement of Science (1869) Among his later published works are *The Mississippi Valley* (1869); *Mineral Wealth and Railroad Development* (1872), *Prehistoric Races of the United States* (1873)

FOSTER, JUDITH ELLEN (HORTON) (1840–1910) An American lecturer, born at Lowell, Mass She removed to Iowa, studied law, and was admitted to the State bar in 1872 She also became superintendent of the Legislative Department of the Woman's Christian Temperance Union, and when that organization was affiliated with the Prohibition party, identified herself with the Non-Partisan Woman's Christian Temperance Union, of which she became president She was a popular lecturer on various topics and published a *Constitutional Amendment Manual* (1882) In 1907 she was appointed a special agent of the Federal Department of Justice

FOSTER, LAFAYETTE SABINE (1806–80) An American political leader, born in Franklin, Conn He graduated at Brown University in 1828 He studied law, settled at Norwich, where he became editor of the *Republican*, and took an active part in politics as a Whig He was elected to the Connecticut Legislature in 1839 and 1840 and was chosen to its sessions of 1846, 1847, 1848, and 1854 (in the latter three sessions acting as Speaker of the Assembly) and to that of 1870 In May, 1854, he was elected to the United States Senate by the combined votes of Whigs and Free-Soil Democrats In 1856 he joined in the movement for the organization of the Republican party and in 1860 was reelected to the Senate as a Republican During the entire Civil War he was chairman of the Committee on Foreign Affairs In 1865 he was chosen President pro tempore of the Senate, and on the death of Lincoln and the succession of Johnson he became the acting Vice President of the United States He declined to be a candidate for reelection in 1867, became a Liberal Republican in 1872, and two years later he was an unsuccessful candidate for Congress on the Democratic ticket He was a judge of the Connecticut Superior Court from 1870 to 1876, in 1878 was on a commission on simpler court procedure, and in 1878–79 was a commissioner to settle the New York-Connecticut boundary dispute Consult Campbell's *Memorial Sketch of Lafayette S Foster* (Boston, 1881)

FOSTER, SIR MICHAEL (1836–1907) An English physiologist, born at Huntingdon and educated at London University In 1869 he became professor of practical physiology there A year afterward he accepted a similar position at Trinity College, Cambridge, and in 1883 was appointed professor of physiology at the University of Cambridge, holding this post till 1903 From 1881 to 1903 he was one of the secretaries of the Royal Society In 1900 he was elected to Parliament as Liberal representative of London University, but was defeated in 1906 His publications include *Primer of Physiology* (1874); *Studies from the Physiological Laboratory in the University of Cambridge* (1876–77), *A Text-Book on Physiology* (1877), *The Elements of Embryology* (1874), with F M Balfour, *Course of Elementary Practical Physiology* (1876), with J N Langley

FOSTER, MYLES BIRKET (1825–99). An English water-color painter and engraver, born at North Shields, Feb 4, 1825 Early apprenticed to E Landell, a wood engraver, he devoted some years to illustrating, first as an engraver and later making original designs on wood for the *Illustrated London News* and *Punch* In 1846 he set up for himself and illustrated Gray's *Elegy*, *The Ancient Mariner*, *Old English Ballads*, Longfellow's *Evangeline*, and other works in poetry and prose, including etchings on steel for Milton's *L'Allegro* and *Il Penseroso* and Goldsmith's *Traveler* About 1859 he began drawing in water colors and in 1862 was made a member of the Society of Painters in Water Colors, where he exhibited over 300 pictures, painted largely in body color and retouched by careful stippling until they acquired almost excessive finish They are skillful in composition and show poetic feeling His choice of subjects was drawn mostly from rural life, and he especially emphasized the landscape element He became very popular, and his works were much reproduced in photographs and chromos Among those well known are "Nutting," "The Bird's Nest," "Sailing the Boat," "Cows in the Pool," "Feeding the Ducks," "Castle of Rhein-

fels," "Birthplace of Burns," "In Full Cry," etc At a later period he also painted in oils, but not with equal success Consult Scherer, *The Birket Foster Album* (Munich, 1880), and biographies by Hunsh (London, 1890) and Cundall (ib, 1906)

FOSTER, RANDOLPH SINKS (1820–1903). An American Methodist Episcopal bishop, born at Williamsburg, Ohio He studied at Augusta College (Millersburg, Ky) and entered the itinerant ministry of the Methodist Episcopal church in the Ohio conference in 1837 In 1850 he went to New York City as pastor of the Mulberry Street Church From 1857 to 1860 he was president of Northwestern University, in 1868 he became professor of systematic theology in Drew Theological Seminary (Madison, N. J), and in 1870 its president He was elected Bishop in 1872 and made visits to the missions of his church in South America (1874), Germany and Scandinavia (1874 and 1883), India (1882), Italy (1883), and Mexico (1886) His publications include *Objections to Calvinism as it Is* (1848), *Christian Purity* (1851), *Beyond the Grave* (1879), *Centenary Thoughts* (1884), *Philosophy of Christian Experience* (1890), *Union of Episcopal Methodisms* (1892), *Studies in Theology* (6 vols, 1886–99), a remarkable series

FOSTER, SIR ROBERT (1589–1663) An English jurist, the youngest son of Sir Thomas Foster, a judge under James I He was called to the bar in 1610 and was knighted and made a justice of Common Pleas in 1640 An eager upholder of Charles, he condemned Captain Turpin (1644), but was merely removed from office by Parliament, while his colleague was impeached for high treason During the Commonwealth he practiced as a conveyancer, and on the Restoration he was appointed Chief Justice of the King's Bench (1660) and dealt sternly with sectaries and political prisoners He persuaded the King to approve the execution of Sir Harry Vane, and was justice at the trial of Sir Charles Sedley in 1663 Consult Foss, *Biographia Juridica* (London, 1870), and Campbell, *Lives of the Chief Justices* (ib, 1874)

FOSTER, ROBERT FREDERICK (1853–) An American authority on card games, born at Edinburgh, Scotland Until 1893 he worked as an architect and civil engineer In 1895 he became card editor of the New York *Sun* He originated the 11 rule at bridge and invented whist markers and self-playing bridge and whist cards His writings include *Foster's Whist Manual* (1890, 3d ed, 1894), *Whist Tactics* (1895), *Foster's Complete Hoyle* (1897, 1909), *Foster's Bridge Manual* (1900, 3d ed, 1908), *Foster's Bridge Tactics* (1903), *Bridge Maxims* (1905), *Practical Poker* (1905), *Call-Ace Euchre* (1905), *Foster's Skat Manual* (1906), *Auction Bridge* (1908, 3d ed, 1910), *Cab No 44* (1910), a novel, *Royal Auction Bridge* (1912, 1914); *Cooncan* (1913)

FOSTER, STEPHEN COLLINS (1826–64) An American song composer, born at Lawrenceville, near Pittsburgh, Pa Foster's musical gifts seem to have been natural, as he taught himself the flageolet when he was but seven Many of his songs, the first of which, "Open thy Lattice, Love," was published in 1842, have become so popular that they may be regarded as veritable folk songs, for which reason it is fortunate that, although simple in technical treatment, they are, as a rule, refined and graceful in their melody. "Louisiana Belle," "Old Uncle Ned," "My Old Kentucky Home," "Massa's in the Cold, Cold Ground," "Ellen Boyne," the famous "Old Folks at Home" ("Down on the Suwanee River"), "Come Where my Love Lies Dreaming," are some of the most popular of Foster's 175 published songs His last song was 'Beautiful Dreamer" Foster was improvident, and notwithstanding the enormous sales of his songs (e g, "Old Folks at Home," 300,000 copies) was frequently harassed for want of money and obliged to sell his manuscripts outright for pitiably small prices He died in New York

FOSTER, STEPHEN SYMONDS (1809–81) An American Abolitionist, born at Canterbury, N H He was a carpenter for several years, then entered Dartmouth College with the intention of preparing for the ministry, and graduated in 1838 While studying at Union Theological Seminary, he became imbued with abolitionist ideas and gave up the ministry to become an antislavery advocate He soon became widely known as an earnest and fearless orator The refusal of the churches to cooperate in the abolition movement aroused his indignation, and he bitterly denounced both churches and clergy as hypocritical and non-Christian His radicalism caused him frequently to be attacked by mobs, and his method of appealing to the people by entering churches during service and addressing the audiences unannounced gave rise to numerous grave disturbances and precipitated several riots In 1845 he married Abby Kelley (see FOSTER, ABBY KELLEY) Besides articles on the slavery question in magazines, he published *The Brotherhood of Thieves A True Picture of the American Church and Clergy* (1843, reprinted, 1886)

FOSTER, THEODOSIA TOLL (1838–) An American author, born at Verona, N Y, and educated at Oneida Seminary She married James H Foster in 1869 and for many years was principal of the Home School at Verona She wrote many stories under the pen name of "Faye Huntington" Her work includes *Mr McKenzie's Answer* (1876), *Ripley Parsonage* (1877), *From Different Standpoints*, with Mrs Alden (1878), *Echoing and Re-Echoing* (1879, new ed, 1906), *Mrs Deane's Way* (1880), *Milleton People* (1884), *What Fade Remembers* (1885), *The Boynton Neighborhood* (1895), *A Modern Exodus* (1897), *His First Charge* (1897), *Lewis Elmore, Crusader* (1898), *Opportunity Circle* (1901), *A Break in Schedule Time* (1901), *Those Boys* (1903)

FOSTER, WILLIAM TRUFANT (1879–) An American educator, born in Boston He graduated from Harvard University in 1901 and from Columbia University (Ph D) in 1911, taught English at Bates College (1901–03) and at Bowdoin (1904–10), after 1905 as professor of English and argumentation, and in 1910 became president of Reed College, at Portland, Oreg In addition, he lectured on the principles of education at the Harvard summer session in 1909 and at Columbia in 1911 He was elected vice president of the American Federation for Sex Hygiene Besides contributions to reviews and magazines, his publications comprise *Argumentation and Debating* (1908), *Administration of the College Curriculum* (1911), *Essentials of Exposition and Argument* (1911), *Social Hygiene and Morals* (1913), *The Social Emergency* (1914)

FOSTO'RIA A city in Seneca and Hancock counties, Ohio, near the boundary line of Wood County, 35 miles south by east of Toledo, on the Baltimore and Ohio, the Lake Erie and Western, the Hocking Valley, the Lake Shore Electric, the New York, Chicago, and St Louis, and the Toledo and Ohio Central railroads (Map Ohio, D 3) It was settled by the father of Charles Foster, Governor of Ohio and Secretary of the United States Treasury in 1891–93, and by him was built up and made an important manufacturing place It has several glass factories, flour mills, lime kilns, automobile and incandescent-lamp factories, a cooperage, spoke and bending works, planing mills, stave and barrel factories, carbon works, etc In the vicinity are oil fields and productive farming country The government, under a charter of 1889, is vested in a mayor, biennially elected, boards of public service and public safety, and a city council Fostoria contains a Carnegie library and a fine Y. M C A building, and owns its water works Pop, 1900, 7730, 1910, 9597, 1914 (U S est), 10,392

FOTCHA. See FOCA

FOTHERGILL, fŏTH'ĕr-gĭl, JESSIE (1851–91) An English novelist, born in Manchester, where her father was a wealthy cotton manufacturer Her first novel, *Healey*, was published in 1875, and her great success, *The First Violin*, in 1877 Her novels, most of which depict life on the moorland and in the factory towns of the north of England, are remarkable for their powerfully drawn studies of character Her published books, besides those mentioned, include *Aldyth* (1876), *The Wellfields* (1880), *Kith and Kin* (1881), *Made or Marred* (1881), *One of Three* (1881), *Peril* (1884), *Borderland* (1887), *The Lass of Leverhouse* (1888), *A March in the Ranks* (1890), *Oriole's Daughter* (1893) A dramatization of *The First Violin* (1904) by Sidney Bowkett was a success

FOTHERGILLIA, fŏTH'ĕr-gĭl'lĭ-a A genus of hardy, ornamental shrubs belonging to the family Hamamelidaceæ, closely allied to the witch hazel The spikes of white flowers appear with or before the leaves early in the spring There are two species natives of southeastern United States The plants are propagated by seeds, which germinate the second year, or by cuttings, which require two years to root

The name is also applied to the variety *fothergilli* of *Nerine curvifolia* grown in conservatories to a slight extent for its numerous brilliant red flowers, which are borne in umbels on long scapes The flowers are especially attractive on account of their glistening in the light, as if sprinkled with hoarfrost Owing to the habit of making growth during the winter and blossoming during the autumn, this plant, like others of its genus, has not become popular as a florist's flower, but is grown only in private greenhouses See Colored Plate of AMARYLLIDACEÆ.

FOTHERGILL PROCESS. A process in photography, devised in 1858 by Thomas Fothergill, which had for its object the preservation of sensitive plates ready for exposure It consisted in the partial removal of the free silver nitrate which adheres to the collodion film when it is withdrawn from the sensitizing bath, as in the ordinary wet-plate process, by washing with water, and the subsequent conversion of the remaining free silver nitrate into silver aluminate and chloride by pouring over the plate dilute albumen containing ammonium chloride, the excess of the albumen being finally washed off with water The plates were set aside to drain on folds of blotting paper, and when dry were ready for use, keeping for some time This process was supplanted by the use of dry plates coated with a gelatino-bromide emulsion

FOTHERINGAY, fŏTH'ĕr-ĭn-gā, THE The stage name of Emily Costigan (q v), in Thackeray's *Pendennis*

FOTHERINGAY CASTLE A famous castle which once stood near Peterborough, Northamptonshire, England It was built in 1405 and was the birthplace of Richard III in 1452 and the place of execution of Mary, Queen of Scots It was demolished by James I

FOTTINGER, fŏt'ĭng-ĕr, HERMANN (1877–) A German engineer and inventor He was born at Nuremberg, Germany, and was educated in the gymnasiums of Nuremberg and the technical institute of Munich In 1903 he received the degree of Ph D from the University of Munich for his dissertation on *Effektive Machinenleistung und effektives Drehmoment und deren experimentelle Bestimmung* (1904) After 1899 he engaged in building ship machinery and in 1906 received the silver medal of the Shipbuilding Society for his turbine inventions (See STEAM TURBINE) In 1909 he became professor at the Royal Technical Institute of Danzig

FOUCAULT, fōō'kō', JEAN BERNARD LEON (1819–68) A French physicist He was born in Paris and was educated for the medical profession His early physical researches were carried on in connection with Fizeau, and the first direct measurements of the velocity of light were due to independent researches by these physicists In 1850, in the course of his experiments, Foucault proved that the velocity of light in air was greater than in water His apparatus consisted of a plane mirror capable of rapidly revolving about a vertical axis, and a concave mirror to which the light was reflected from the first mirror An achromatic lens, a transparent mirror to reflect the light on to an eyepiece, and a source of light comprise the other essential features of the apparatus, which differed from that of Fizeau's in that it could be entirely contained in a laboratory and did not involve the reflection of the beam of light from a mirror far distant In 1851 he demonstrated the rotation of the earth on its axis by the diurnal rotation plane of oscillation of a long pendulum with a heavy weight The following year he invented the gyroscope (q v) In 1854 he was appointed physicist at the Paris Observatory In 1857 he invented the polarizing prism known by his name and in 1858 succeeded in giving to the mirrors of reflecting telescopes the form of a spheroid or a paraboloid of revolution He adjusted the great reflector in the telescope of the Paris Observatory in 1859 In 1865 he published a series of papers on a modification of Watt's governor, showing how its period of revolution could be made constant, and on an apparatus for regulating the electric light He also showed how the sun can be observed without injury to the eye from the excess of light He was scientific editor of the *Journal des Débats* from 1845. In conjunction with Regnault he published an important paper on binocular vision. He received the decoration of the Legion of Honor in 1850 and was made

an officer in 1864. For his biography consult *Léon Foucault, sa vie et son œuvre scientifique* (Brussels, 1879), and Lissajous, *Notice historique sur la vie et les travaux scientifiques de Léon Foucault* (Paris, 1875)

FOUCAULT CURRENTS, or EDDY CURRENTS. Induced currents of electricity generated in a plate or other mass of metal by its motion with regard to a magnetic field or by variations of that field These currents circulate entirely within the metal, and their energy is expended in generating heat. They are known as Foucault currents, after this famous physicist, who demonstrated that when a copper disk was rotated between the poles of a strong electromagnet its temperature was greatly increased, though the currents thus produced had been previously observed by other investigators. They play an important part in electrical work, and their effect was first noticed in the construction of compasses where it was found that the magnetic needle would come to rest much quicker when it was placed above a plate of metal That the currents were due to induction (q.v) was shown by Faraday, and Foucault and others constructed interesting apparatus to exhibit their action In the galvanometer a useful application is found when it is desired to damp the vibrations of the magnetic needle, so that it will return to a point of rest quickly through the action of the magnetic field generated by the induced currents in surrounding plates or masses of metal The most important effects of Foucault currents occur perhaps in dynamo-electric machinery (q v), and in the armatures of dynamos and motors and the cores of transformers a laminated form of construction is employed and the different parts separated from each other, so that there will be no currents circulating as the armature revolves or the alternations of current occur The greatest care in the design and construction is necessary in such cases in order to prevent the generation of a large amount of heat See DYNAMO-ELECTRIC MACHINERY, ELECTRICITY, INDUCTION, MAGNETISM, TRANSFORMER

FOUCAUX, fōō'kō', CHARLOTTE MARIE (FILON) (1842–) A French author, the wife of Philippe Edouard Foucaux. Under the pseudonym of Mary Summer she wrote several works on Sanskrit literature, including *Histoire du Bouddha Sâkya-Mouni* (1874), *Contes et légendes de l'Inde ancienne* (1878), a work which was crowned by the Academy, and *Les héroines de Kâlidâsa et les héroines de Shakespeare* (1879). She also wrote several studies and romances of the Revolution and the Restoration, among which are *Le dernier amour de Mirabeau* (1877), *Les belles amies de M de Talleyrand* (1880), *Une intrigante de la Restauration* (1888), *Quelques Salons de Paris au XVIIIème siècle* (1898)

FOUCAUX, PHILIPPE EDOUARD (1811–94). A French Orientalist, born at Angers He was a pupil in Sanskrit of Eugene Burnouf at Paris, and from 1842 to 1852 directed a course in Thibetan at the Ecole des Langues Orientales In 1852 he was appointed to occupy temporarily the chair of Sanskrit literature in the Collège de France and in 1862 succeeded Burnouf as titular professor His publications include *Histoire du Bouddha Sakyamouni* (2 vols, 1847–48), *Grammaire de la langue thibétaine* (1859), *Onze episodes du Mahâbhârata* (1862); *Le religieux chassé de la communauté* (1873), *Lalita-Vistara* (2 vols, 1884–92), and translations of several works of Kâlidâsa

FOUCHÉ, fōō'shā', JOSEPH, DUKE OF OTRANTO (1759–1820) A French politician and Minister of Police He was born at Pellerin in the Department of Loire-Inférieure, May 21, 1759. His father was a merchant captain, and the son was educated with a view to following the same calling, but early in life young Fouché decided for the church and, after attending the College of Oratorians at Paris, became a teacher at Juilly, Arras, and Vendôme successively In 1790 he had risen to be principal of the College of Nantes As soon as the Revolution seemed likely to succeed, Fouché threw aside his ecclesiastical habit and was elected a deputy to the National Convention (1792) from Loire-Inférieure At first he was a Girondin, but soon afterward joined the Jacobin party No one was more ardent in bringing about the death of Louis XVI than Fouché, who took a leading part in the inauguration of the Worship of Reason, and in the spoliation of the churches which took place in 1793–94—a measure which replenished the coffers of the Republic In October, 1793, he was sent with D'Herbois and Villers as commissioner to Lyons and showed himself a monster of cruelty, boasting publicly of the number of victims he had caused to be put to death Excluded from the Jacobin Club by Robespierre, after he had held the presidency, because he mocked the former's theistic revival, Fouché was in danger of losing his life and was even arrested, but was released by the amnesty of Oct 26, 1795 He was one of the chief men who finally brought about Robespierre's fall He ingratiated himself with Barras and was sent as Minister Plenipotentiary to Milan There he plotted against the Cisalpine Republic and was expelled, but immediately was sent as Ambassador to Holland A few months later he was recalled and made Minister of Police, July, 1799 In this capacity he showed great vigor, he suppressed the newly organized Jacobin Club, under orders from Sieyès, and a large number of newspapers and created an extensive system of espionage He was won over to the Bonapartist cause, however, participated in the coup d'état of the 18th Brumaire, and became Minister of Police under the Consulate In the new government, strangely enough, he became the champion of moderation, by his advice the list of émigrés was closed, a general amnesty was proclaimed, and a policy of conciliation steadily pursued He was forced to resign his office in 1802, because Bonaparte feared his power and cunning He was raised to the Senate with a large pension, but he still kept up a police system of his own, and in 1804 was reappointed to his former place on account of the many plots against the life and power of Napoleon It was at this time that he made his famous remark on the execution of the Duc d'Enghien "It is worse than a crime, it is a blunder"

Under the Empire Fouché was Minister of the Interior as well as head of the police and controlled the internal government of France during the frequent and prolonged absences of the Emperor In 1808 he received the title of Duke of Otranto In 1809, on the occasion of the landing of English forces at Walcheren, he issued a proclamation calling on France to show that she could repel the invader without the presence of the Emperor. The proclamation had

the desired effect, but it so incensed Napoleon that Fouché was deprived of the portfolio of the Interior, and shortly afterward interference in diplomacy cost him his office as Minister of Police (1810) He had to flee from France because he refused to give up secret papers in his possession Later he was allowed to return and reside on his estate at Pont Carré In 1813 he was sent as Governor to the Illyrian Provinces, but after the battle of Leipzig was recalled and sent to Naples to watch Murat Fouché, however, had been in secret negotiations with the Bourbons for some time and did little to prevent Murat's defection In 1814, on returning to Paris, he was welcomed by Louis XVIII and offered the police portfolio, but declined He foresaw the return of Napoleon from Elba and during the Hundred Days resumed his police functions, though at heart a traitor to the cause he espoused He always looked ahead and made sure of his own future before committing himself irretrievably to one master After Waterloo he went over to the Bourbons and aided in the pacification of the country as Minister of Police, but the law against the regicides in 1816 exiled him from France He retired to Prague, became an Austrian subject in 1818, and spent his last years at Triest There is no good single work on Fouché His *Mémoires* (4 vols, Paris, 1822–24, Eng trans. 1904 et seq), while based on genuine documents, have been declared a forgery by his family For various aspects of his career consult Madelin, *Fouché, 1759–1820* (Paris, 1901), Forques, "Le dossier secret de Fouché" in *Revue Historique*, vol xc (Paris, 1906), D'Hauterive, *La police du premier empire* (Paris, 1908).

FOUCHER, foō-shā', JEAN (1508–67) An explorer and colonizer in South America He was born at Cambrai, Flanders, became a sailor, and accompanied Sebastian Cabot on the voyage to South America which resulted in the discovery of the Paraguay River He remained at the mouth of the Plata until 1529 and joined the Spanish expedition of Mendoza to Paraguay in 1534, as pilot After the founding of Buenos Aires he led an exploring party inland, made an adventurous journey as far as the base of the Cordilleras in Peru, and returned to the eastern coast in 1539. He became one of the advisers of Cabeza de Vaca, the Governor, whom he induced to adopt a friendly policy towards the natives, and with whom, in 1544, he was imprisoned and sent back to Spain In the following year he was pardoned and returned to South America, where, as Governor of Entre Ríos, he continued his explorations and did much to establish friendly relations between the colonists and Indians

FOUCHER DE CAREIL, foō'shā' de kà'rā'y', LOUIS ALEXANDRE, COUNT DE (1826–91) A French diplomat and author, born in Paris In 1872 he became Prefect of the Department of Seine-et-Marne and in 1876 a member of the Senate, and in 1883–86 was Ambassador at the court of Vienna. A recognized authority on the philosophy of Leibnitz, he wrote a series of expository volumes, including: *Réfutation inédite de Spinoza par Leibniz* (1854), *Leibniz, la philosophie juive et la Cabale* (1861), *Leibniz, Descartes et Spinoza* (1863), and worked on an edition of the *Œuvres de Leibniz* (1859 et seq . 2d ed, 1867 et seq), to include 20 volumes, of which only seven appeared, which followed his *Lettres et opuscules inédits de Leibniz* (1854–57)

FOUCQUET See FOUQUET

FOUGÈRES, foō'zhâr' The capital of an arrondissement in the Department of Ille-et-Vilaine, France, situated on a hill on the Nançon River, 28 miles northeast of Rennes (Map France, N, D 4) It is a handsome, well-built town and in the old quarter retains mediæval traces in the ancient houses with arcades which overhang the sidewalks The castle of Fougères, a picturesque object, was at one time considered the key to Brittany The churches of St Sulpice and of St Leonard have many interesting features, a college and three hospitals are among the principal public buildings In the neighborhood is a great forest containing prehistoric megalithic and Celtic remains The town has flourishing dye works tanneries, and glass works Pop, 1901, 20,952, 1911, 13,753 Fougères is celebrated for the engagement which took place in the vicinity between the Vendéan Royalists and the Republicans, Nov 15, 1793

FOUILLÉE, foō'ya', ALFRED JULES EMILE (1838–1912) A French philosopher, born in La Poueze, Maine-et-Loire He began his career as a teacher in the colleges of Louhans and Auxerre and the lycée of Carcassonne and was afterward professor of philosophy at Douai and Montpellier For three years (1872–75) he held an important position in the normal school at Bordeaux, but, when forced by ill health and failing sight to retire in 1875, he devoted himself to the production of treatises upon the philosophies of Plato and Socrates, a *Histoire de la philosophie* (1875, 7th ed, 1894), *La science sociale contemporaine* (1880, 5th ed, 1911), *La propriété sociale et la démocratie* (2d ed., 1904), *Critique des systemes de morale contemporaine* (4th ed, 1899), *L'Evolutionisme des idées-forces* (1890, 5th ed, 1899), *La psychologie des idées-forces* (1893), *Descartes* (1893), *Psychologie du peuple français* (2d ed, 1898), *La France au point de vue moral* (1900), *Nietzsche et l'immoralisme* (1902), *Esquisse psychologique des peuples européens* (1903), *Le moralisme de Kant et le moralisme contemporain* (1905), *La morale des idées-forces* (1907), *Le socialisme et la sociologie reformiste* (1909), *Le pensée et les nouvelles anti-intellectualistes* (1911), *Esquisse d'une interprétation du monde* (1913), ed by Boirac. He also contributed to the *Revue des Deux Mondes* and the *Revue Philosophique* *Education from a National Standpoint* (1892) is a version in English by Greenstreet of Fouillée's work on education He has attempted a synthesis of Platonic idealism and modern evolution in a theory of "motor ideas" (*idées-forces*) or "will to live" (*vouloir vivre*) conditioning psychical and physical progress His wife, formerly Madame Guyau, mother of the philosopher Jean Marie Guyau (q v), wrote children's books (under the nom de plume of "G Bruno"), notably *Le tour de la France par deux enfants*. Consult Guyau, *La philosophie et la sociologie d'Alfred Fouillée* (Paris, 1913)

FOUL BREATH See BREATH, OFFENSIVE

FOUL BROOD See BEES, DISEASES OF

FOULD, foōld, ACHILLE (1800–67) A French financier and statesman He was born in Paris, Nov. 17, 1800, of Jewish parents and was educated at the Lycée Charlemagne Fould came naturally by his financial gifts, his father being a wealthy banker of Paris In 1842 he began his political career as a member of the Council General of the Department of Hautes-Pyrénées,

and was immediately after elected a deputy for Tarbes, the chief town of that department In the Chamber of Deputies he acquired a high reputation for the ability with which he handled questions of finance, and in 1844 was appointed reporter to the commission on stamps on newspapers. At that time he was a stanch supporter of Guizot After the revolution of 1848, however, he accepted the new regime and offered his services to the provisional government In July, 1848, he was elected to the Constituent Assembly for the Department of the Seine and rendered valuable services to the government, in particular by advising against the issue of assignats In this year he wrote two papers on this subject *Pas d'Assignats* and *Observations sur la question financière* During the presidency of Louis Napoleon he was four times Minister of Finance, where he played an important part in the reforms undertaken and in the opposition to free trade He once more resigned his position in January, 1852, in consequence of the decree ordering the confiscation of the property of the Orléans family The same day, however, he was created a senator, and shortly afterward returned to power as Minister of State In this capacity he superintended the Paris Exposition of 1855 and the completion of the palace of the Louvre In 1857 he became a member of the Academy of Fine Arts He remained one of the confidential ministers of Napoleon III till December, 1860, when he was succeeded as Minister of State by Count Walewski In November, 1861, he was reappointed Minister of Finance and held office until January, 1867 He died October 5 of the same year at Tarbes His three sons were all prominent in French politics

FOUL IN THE FOOT. See FOOT ROT. The name has been applied also to tubercular foot rot, tubercular disease of the bones, and canker (q v)

FOULIS, fow'lis, ROBERT (1707–76) and ANDREW (1712–75) Two eminent printers of Glasgow, brothers Robert, the elder, for some time practiced as a barber—in those days a profitable and respectable profession His abilities attracted the notice of the celebrated Dr Francis Hutcheson, then professor of moral philosophy in Glasgow University, who advised him to establish a printing press Accordingly he spent 1738–39 in England and France with his brother Andrew, who apparently had been designed for the church and so had enjoyed a better education In 1741 he started in business in Glasgow as a printer, his first publications were chiefly of a religious nature In 1743 he was appointed printer to the university In this year he published an elegant edition in octavo of *Demetrius Phalereus on Elocution*, supposed to be the first Greek work printed in Glasgow In 1744 he brought out his celebrated immaculate edition of Horace (small 8vo) Each printed sheet of this was hung up in the college at Glasgow, and a reward was offered for the discovery of any inaccuracy But, in spite of all efforts, six errors remained Soon after he took his brother Andrew into partnership, for 30 years they continued to bring out, particularly in the Latin and Greek classics, some of the finest specimens of correct and elegant printing which the eighteenth century produced, either in Great Britain or on the Continent. Among them were Cicero's *Works* (20 vols.), Cæsar's *Commentaries* (folio), Homer (4 vols), Æschylus, Herodotus (9 vols), an edition of the Greek Testament, Vergil, Gray's *Poems*, Pope's *Works*, a folio edition of Milton, and other publications in English In all over 550 publications came from their press To promote the cultivation of the fine arts in Scotland, Robert Foulis, after a two years' visit to the Continent in preparation, commenced, in 1753, an academy at Glasgow for the instruction of youth in painting and sculpture The expense attending this institution proved too great, and the printing business declined, but continued to be carried on till the death of Andrew In 1776 Robert exhibited and sold at Christie's, Pall Mall, London, the remainder of his paintings, in the hope of recouping his broken fortunes, but after all expenses were defrayed the balance in his favor amounted to only 15 shillings He died the same year at Edinburgh, on his return to Scotland For a catalogue of the publications of the Foulis brothers, consult Duncan, *Notices and Documents Illustrative of the Literary History of Glasgow* (Glasgow, 1831), consult also Tedder in *Dictionary of National Biography*, vol xx (London, 1889), and Murray, *Robert and Andrew Foulis and the Glasgow Press* (Glasgow, 1913)

FOULK, fōlk, GEORGE C. (?–1894) An American naval officer and diplomat He was born in Pennsylvania in the early sixties and entered the United States Naval Academy at Annapolis at 14, graduated four years later at the head of his class, and as ensign served in the United States navy on the Asiatic Station In addition to the ordinary routine of his profession he mastered the Japanese language and subsequently the Korean He was detached in 1883 to serve as interpreter and secretary to the Korean Embassy, the first ever sent to Western countries Arriving in Seoul in June, 1884, he was made naval attaché to the United States Legation and at government instance made a journey through the country, publishing in the *United States Foreign Relations* his report He enjoyed the confidence of the King and the progressive men and on their behalf brought out military instructors and schoolteachers from the United States and aided in the formation of a stock farm and breeding station Though foreseeing the political storm which broke Dec 4, 1884, he made a journey in the southern provinces, and after many dangers and hairbreadth escapes he reached Seoul, acting as chargé d'affaires *ad interim* for 18 months, the youngest man ever intrusted with the duties of a minister from the United States to a foreign country Reentering the service of the navy, he later resigned, married a Japanese lady, and became professor of mathematics in the Doshisha University in Kyoto, where he died in 1894.

FOULKE, WILLIAM DUDLEY (1848–) An American civil-service reformer and author, born in New York City He graduated at Columbia College in 1869 and at Columbia law school in 1871, was admitted to the bar in 1870, and practiced in New York City until 1876 In Richmond, Ind, he was for 15 years an attorney of the Pittsburgh, Cincinnati, and St Louis Railway and for one year (1883) an editor of the *Palladium* and afterward of the *Evening Item* About 1890 he retired from the bar He was a member of the Indiana State Senate in 1883–85, in 1885 introduced a bill to establish civil-service reform in Indiana, and organized and became

president of the Indiana Civil-Service Reform Association His investigations into the management of the State Hospital for the Insane revealed grave maladministration, due principally to the spoils system In the interest of the National Civil-Service Reform League, as chairman of a special commission, he conducted in 1889–90 investigations of the Federal civil service He was United States Civil Service Commissioner in 1901–03 and president of the National Municipal League from 1910 to 1913 His publications include *Slav or Saxon* (1887, 3d ed, 1904), "Civil-Service Reform Its Later Aspects" (*Economic Tracts*, No 31, 1890), "The Present State of our Civil Service" (in *Publications* of American Social Science Association, 1891), "The Theory and the Practice of Civil-Service Reform" (in *Proceedings* of National Civil-Service Reform League for 1894), "Proportional Representation An Address before the Municipal League of Boston" (*Publications* of the League, No 4, 1896), a biography (1898) of Oliver P Morton, war Governor of Indiana, *Maya, a Story of Yucatan* (1900), *Protean Papers* (1903), a translation (1906) of Paulus Diaconus' history of the Langobards, *Dorothy Day*, a novel (1911), *Maya A Dramatic Poem* (1911)

FOULLON, fōō'lôn' (often wrongly spelled FOULON), JOSEPH FRANÇOIS (1717–89) A French administrator, born at Saumur He was Intendant General of the Army during the Seven Years' War and became in 1771 Intendant General of Finance Possessor of great wealth through marriage with the daughter of a rich Dutch family, in the popular mind he became the personification of all that was detestable, avaricious, and hard-hearted, being nicknamed "Familiar Demon (*Ame Damnée*) of the Parlement," although actually he was generous and sympathetic and in 1788 gave 60,000 francs to sufferers from cold and famine He was active in furthering the measures for the defense of the crown at the outbreak of the Revolution, and on July 12, 1789, was appointed Minister of the King's Household, succeeding Saint-Priest, when Necker was dismissed He attempted to trick the Paris mob by a story of his death and by an elaborate funeral (really of one of his servants) The ruse was unsuccessful He was caught at his estate, Vitry, near Fontainebleau, and was brought back to Paris He was dragged through the streets with a bunch of hay stuffed in his mouth—because it was believed that he had said "Let the people eat grass"—and in spite of the pleas of Lafayette was hung to a lamppost (July 22) Possibly his death, like Berthier's, was not the result of popular fury alone, for Mirabeau's correspondence proves that assassins had been hired to murder both. Consult Chassin, *Les élections et les cahiers de Paris en 1789* (Paris, 1889)

FOUL PLAY. A romance by Charles Reade and Dion Boucicault, published in London, 1869

FOULQUES. See FULK

FOULQUES, fōōlk, or **FUL'CO,** OF NEUILLY A famous pulpit orator of the twelfth century, the preacher of the Fourth Crusade His early life was careless, but he experienced a sudden conversion and, ashamed of his ignorance, went to Paris to study Here his earnestness attracted attention, and he was encouraged to preach He commenced a series of journeys, exhorting to repentance, and by the rigor of his asceticism enforcing his sermons He began to preach the Crusade in 1198 In 1201 he asserted that he had induced 200,000 to accept the cross He did not live to hear of the result, for he died at Neuilly, March, 1202 Consult Villehardouin, *La conquête de Constantinople*, ed by Wailly (Paris, 1874)

FOUL WEATHER, CAPE See CAPE FOUL WEATHER

FOUL-WEATHER JACK A nickname given to the English Admiral John Byron (1723–86), on account of his ill luck at sea, whether sailing or fighting He was wrecked in the *Wager* (1740) and afterward made a hazardous voyage around the world

FOUNDA'TION (from Fr *fondation*, Lat *fundatio*, from *fundare*, to found, from *fundus*, bottom) The word is used, both in the concrete and abstract, to denote the base on which anything is supported In relation to a building the term is often used to denote either the construction below grade (or ground surface) or the natural material on which the construction rests. The modern tendency, and advisably so, is to use the word in the former sense and to designate the supporting material as the foundation bed, and the terms will be so used in this article The footings are the lower courses of the foundation, which are offset to give greater bearing area The importance of correctly designing the foundation and proportioning the area of the foundation bed is evident, for on them does the integrity of the structure depend No branch of engineering requires greater practical experience, for in the superstructure the materials are of uniform character, and their physical properties and allowable stresses are well known, while no such uniformity exists in those which compose the foundation bed, and the conditions under which they are found are so varied that no definite values can be given in relation to them

Historical The buildings of ancient primitive races were naturally of inferior character, and we find no remains of such construction with the exception of the pile foundations of the lake dwellers These people constructed dwellings over the shallow waters of lakes throughout Europe from the Stone age down to the time of the Romans These foundations are interesting as being the earliest use of piles, but it is to be noted that they were employed more as a means of providing the necessary construction below water than in the modern use of increasing the bearing value of the foundation bed In fact the piles were often driven through holes in planks, the planks acting as a spread footing in giving additional bearing surface on the mud In many other cases, however, the piles were driven through the mud to the underlying marl In general, they are now in a poor state of preservation, often being worn entirely away above the mud bottom of the lakes by the action of waves and lake currents Some piles have been found and pulled up, apparently of their original size, though the wood had deteriorated into a brittle condition The piles generally were from 4 to 6 inches in diameter—though they have been found up to 14 inches—and from 8 to 16 feet long They were pointed at the lower end and were driven by large wooden clubs

The Egyptians, while of a much more advanced civilization, in point of time antedated the lake dwellers, and the pyramids and some of the adjacent temples are the oldest work of man in a

fair state of preservation These great monuments are founded on rock and bear the testimony of centuries that good bedrock is unequaled for a foundation The pyramid form in itself tends to permanency, and for this reason even greater demonstration of the value of a rock foundation bed is given by the temples. The granite one at Gizeh was in fair condition down to historical times, and the temple of the pyramid at Medum was discovered 25 years ago in a perfect state of preservation The Egyptians' finest construction was that of the fourth dynasty, their work deteriorating after that time In general, their foundations consisted of a foundation of stone or of sun-dried bricks started a few feet below the ground surface This was also the usual construction of the Assyrians and Babylonians, but both of these nations used great quantities of baked bricks laid in a mortar made from bitumen The bricks of Nebuchadnezzar were 12 to 13 inches square and 3½ inches thick and of such good quality that they are still largely used for buildings in Hillah and Bagdad

The foundations of the Greeks seem to be but a slight advance on their predecessors The Romans were the great engineers of their time, and many methods now in use date from them They were skillful in subaqueous construction and used piles and cofferdams of single and double walls—pumping out the latter before laying the masonry—and other special methods of foundation construction They used concrete extensively and made hydraulic cement by mixing pozzuolana and lime and invented pile drivers. The foundations of buildings in the Forum are probably the oldest example of those built on poor soil They consisted, in general, of massive footings of concrete or masonry, in some cases the layer of concrete extended over the entire area covered by the building and was many feet in thickness The writings of Vitruvius are the oldest existing books on engineering and give us an accurate idea of Roman science of construction. He gives many rules and methods to be followed in the design and execution of structures Interesting features are his proportions for retaining walls and his belief in the necessity of charring piles before driving to prevent deterioration, this latter being at variance with modern practice for piles below water

General Requirements. The function of a foundation is to support safely the loads brought upon it by its own weight and those of the superstructure. Safety does not require that no settlement shall occur, but it does require that it be uniform Unequal settlement causes excessive strains throughout the structure, producing cracks and other defects, and may result in the collapse of the building. As it is difficult to obtain uniform settling, it is better to make the foundation as unyielding as practicable The character of the subsoil having been determined, the depth to which the foundation is to be carried must be decided The footings may be sufficiently spread to be safely supported on a stratum of low bearing value, but it may be cheaper and is generally safer to excavate down to a firmer layer, where less area will be required In general, the deeper foundation at the same cost is to be preferred, and especially so in city work, where there is danger of a disturbance to the soil from adjoining building operations. The loads of the walls, columns, piers, etc, must be distributed over the required area, which is accomplished by means of the various types of foundations, hereinafter described

Principles of Design. In the design and construction the following principles should be observed 1 The action of frost and the percolation of water should be prevented by starting the footings below frost line on a stratum free from seepage, or, if the latter is not feasible, a system of drains may be used to divert the flow of water 2 The materials of construction should be proof against deteriorating influences or made so by some protective covering Wood continually wet, brick or masonry laid in cement mortar, concrete, and steel protected from moisture meet this condition 3 The foundation bed should be at right angles, or nearly so, to the line of pressure If the stratum to be built on is inclined, it is not necessary to level off the whole area, the same effect being produced at less cost by cutting a series of rough steps 4 The unit load on the foundation bed must not exceed the safe supporting, or "bearing," value of that material This is accomplished by making the area of the footings of the proper size When the allowed unit of bearing and the weight of the superimposed load are known, the required area is given by a simple process of division The loads to be supported generally can be calculated readily, but the determination of the bearing capacity of the soil is a matter requiring skill and much experience on the part of the engineer and is one of the chief problems in substructure work

Allowable Loads on Various Materials. Owing to the infinite number of variations in the material encountered and the conditions affecting it, no definite values can be given Even for the same material under the same conditions, the allowable unit will vary with the type of building to be erected—a much higher value may be used for a comparatively broad low structure than for a high narrow one, as a chimney, where a slight settlement would be dangerous It is obvious that for economy the greatest safe-bearing value of the soil must be used, which can only be determined by practical experience supplemented by tests A knowledge of geology is of material assistance in making a proper estimate of the character of the foundation bed However, a fair idea of the relative value of safe loads per square foot on usual foundation beds may be obtained from the following figures rock, 20 tons and upward, gravel, 6 to 8 tons, clay, dry, 3 to 5 tons, sand, 2 to 4 tons Clay, if wet, becomes soft and plastic and therefore liable to settle under very small loads The value of sands depends on the conditions restraining its tendency to flow under pressure If perfectly confined, as in a surrounding cylinder, it will sustain very large loads, if entirely unrestrained and subjected to a flow of water, it is almost as unstable as the water itself

Ordinary Footings The most primitive form of foundation consists of a wooden timber laid directly on the ground, with the studs and floor beams resting on its top As the bearing surface is small and as it rots after a few years, this construction is obviously applicable only for unimportant or temporary structures, such as sheds An improvement is effected by blocking up the timber on occasional stones, increasing the life of the sill The bearing area may be increased by using a continuous course of stones, which is the usual construction for barns. The typical foundation for dwelling houses is a

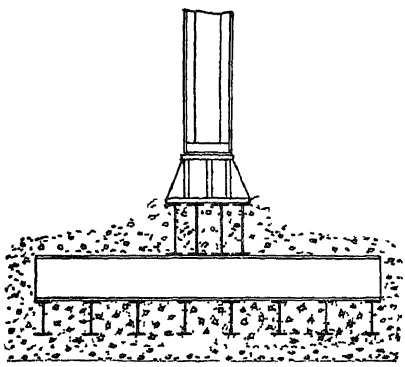
development of the foregoing, the course of stones being replaced by a masonry, brick, or concrete wall extending below the cellar floor or at least below the frost line The wall is often started on a footing course to give greater bearing area

Spread Footings For heavier structures a wider footing is obtained by sloping the foundation wall outward towards the bottom, or by using a number of projecting courses, thus making the wall a series of footings The same result is often produced by special methods, as a steel grillage or a reinforced concrete slab or mat The allowable angle of slope or amount of offset depends on the material used and the unit load supported This value is sometimes given by building codes of cities, but it is necessarily unreliable for general application, and a calculation should be made for each case If owing to adjoining buildings the projections may be made only on one side, the effective limit of total offset is reached when the footing course is about one and one-half times the thickness of the wall above the top offset, or beginning of the batter If made more than this, there will be little or no pressure under the toe, and that under the heel will be correspondingly increased This is a fact that has often been overlooked by builders, and settlement from this cause is not unusual If, however, the projections may be made equally on both sides, any width of footing may be obtained by going deep enough. The cost of deep excavation and of the large amount of masonry required economically limits this type of footing when resting on ordinary ground to buildings not exceeding five to seven stories

Steel Grillage. The application of steel to building construction has developed a modification of the spread footing by which one or more layers of steel beams or girders are used to obtain a shallow footing of the required area and strength, the beams of each course being set on and at right angles to those of the layer below. The steel should be thoroughly protected from moisture by being embedded in concrete Steel rails and even wooden planks were formerly used as an expedient, but the beams are stiffer and better The large area which may be obtained by this method makes it adaptable for heavy loads, and it has been successfully used for buildings of 20 stories, in which cases the grillage may extend over the entire area covered by the building. The objection to such a foundation is that any disturbance of the adjoining soil may cause a flow or yielding of the supporting stratum and cause dangerous settling If the grillage is used for a wall footing, there is only one layer of beams, which are placed at right angles to the line of the wall This method has been largely used in Chicago, and a typical foundation for a column is shown in Fig 1

Deep Foundations. When the material at the level at which spread footings would ordinarily be constructed is not suitable, or in case a greater depth is desirable for any reason, such as protection from future adjoining excavations, it is necessary to carry the foundations down to an underlying stratum of greater supporting power Recourse must then be had to the use of piles or to special methods of excavating and construction

Pile Foundation. In its essentials a pile foundation consists of a number of piles sunk into the ground and carrying on their tops a platform of timber or concrete Piles are of timber, iron, or concrete Iron piles are usually either screw piles or disk piles A screw pile consists of a shaft, usually of iron, but sometimes of wood, having at its foot an iron casting provided with one or two turns of a screw, the blades of which vary from 1½ feet to 5 feet in diameter In disk piles the screw blades are replaced by a circular iron disk Timber piles are round tree trunks with the knots and roughness dressed off The method of sinking piles varies with their form Iron screw piles are driven by screwing them into the foundation soil, timber piles are driven by means of hammers or the water jet, and disk piles are driven by the water jet. (See PILE) The supporting



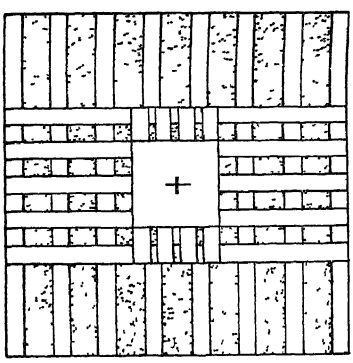


FIG 1 TYPICAL COLUMN FOUNDATION

power of piles is due either to their acting as a column whose lower end rests upon a hard stratum, or to the friction of the earth upon the side of the pile, or to a combination of both of these actions Various mathematical methods are employed for calculating this supporting power, which varies with the character of the soil and the depth of the pile At best the supporting power of piles can only be approximated, and it is customary to load them only to a fraction of their supporting power in order to avoid chances of failure The number of piles to be used in any particular foundation will depend upon the weight to be supported and other load conditions, but it is seldom practicable to drive them closer together than 2½ feet centre to centre

After being driven, the tops of the various piles are cut off to a common level, and they are ready for the construction of the platform or capping If a timber platform is used, it usually consists of one or more courses of timber

fastened to the tops of the piles and planked or floored over If concrete is employed, the earth is excavated between the piles to a level slightly below their tops, and the resulting spaces are filled with concrete On top of the piles and the previously placed concrete a layer of concrete is carried up, thick enough to cover the tops of the piles and to form the footing course, or platform on which the remainder of the foundation structure is built In order that wood may endure it must be permanently dry or continuously wet As the former is impracticable, the latter condition must be maintained, and for this reason the tops of wooden piles must be kept below water level Their use is, therefore, limited to locations where the water level is at no great distance below the required depth of footings, as otherwise there will be an excessive cost for excavation In cities the ground water level is liable to vary, due to pumping or artificial drainage or other change of conditions, and in several instances it has receded sufficiently to cause the rotting of the tops of piles in the vicinity, thereby causing the settling of buildings supported on piles

Concrete Piles Piles made of concrete are now largely used, and are applicable to all places where wooden ones can be driven and also to those places where wood would deteriorate, such as above a permanent water level or where the teredo exists Due care, however, should be taken to prevent the action of frost on wet concrete The piles are generally reenforced with steel rods embedded in the concrete forming the pile They are sometimes cast, or "formed," complete in removable wooden forms and allowed to harden and attain strength aboveground before driving, in which case they are placed and driven like wooden piles They may otherwise be constructed in place by driving a hollow cylindrical steel shell to the required depth, in which the reenforcing rods may then be inserted and the concrete deposited In the Raymond method a light steel shell reenforced by a steel mandrel is used The mandrel, designed to give the required strength during the driving operation, is withdrawn before concreting, and the outer shell is left in place to act as a form In the Simplex method a heavier shell is used, which is gradually withdrawn as the concrete is placed, so that on the completion of the pile the shell has been entirely removed and may be used over again

Methods of Excavation When foundation piers or walls must be carried down to a considerable depth, special methods of excavation are required to prevent the inflow of water or surrounding material. The construction to prevent this inflow varies with the great variety of conditions encountered, and many different types are in use, but the methods may be broadly divided into three classes (A) cofferdams, (B) caissons, (C) the freezing process Cofferdams are temporary structures inclosing the space to be occupied by the foundation and are often removed on the completion of the work Caissons are permanent structures forming an integral part of the foundation and are used as a means of placing the foundation in position, in general, they are large water-tight boxes within which excavation can be made below the water or ground surface Caissons are often surmounted with cofferdams, so that the surrounding temporary construction above ground or water level may be readily removed, exposing the finished surface of the pier. On this classification cofferdams comprise (1) sheet piling, (2) the poling board, (3) the Chicago method, and (4) cofferdam for subaqueous work Caissons comprise (1) box caissons, (2) open caissons, (3) pneumatic caissons

Sheet Piling. Ordinary wooden sheet piling, or sheeting, consists of a continuous line of vertical planks held against the side of the excavation by horizontal timbers known as waling, or breast timbers, these in turn being supported either by cross braces extending across the excavation to the opposite waling timber or by inclined struts extending to the bottom of the excavation, where a support is provided in the undisturbed material The cheeting planks may be square-edged if the material has some cohesion, but where water or running sand is to be excluded the planks should be tongued and grooved or splined The sheeting was formerly driven by using ringed wooden mauls, and this is still usual for small work or for moderate depths of drive, but where the amount of driving is considerable, power hammers operated by compressed air or steam are now used If the required depth cannot be reached by the first set of planks, or "drive," a second and some times a third and fourth set are used In practice, a shallow excavation is first made to the proper line for the outside of the sheeting, the top breast timber is temporarily secured in place, and the planks are placed vertically between the timber and the bank As the excavation progresses, the planks are successively driven down a few inches in turn so as to follow the excavation Additional waling or horizontal timbers and braces are added as required Sheeting made of steel is now being largely used in place of wood It has the advantage that it can be driven in advance of the excavation, reducing the likelihood of any flow of material under it It has greater strength and can be driven to greater depths and often may be drawn and used over again As generally manufactured, it is interlocking, so that there is less danger of its getting out of line and having open spaces causing leaks

Poling-Board Method The poling-board method is largely used in mining operations and has occasionally been used in deep pits for piers. It differs from the sheet-piling method in that the sheeting used is in relatively shorter lengths and is not driven vertically but with a slight outward flare The various supporting breast timbers, or "sets," are placed vertically over each other, at a distance apart slightly less than the length of the planks, or poling boards The bottom of each poling board is outside of the breast timber, and the top is inside and nailed to it, successive sets of poling boards slightly overlapping

Chicago Method. This method differs from that of ordinary sheet piling, as the excavation is first made, and afterward the sides of it are supported It is best adapted to a circular form, and consequently when it is used the piers are made of that shape In its operation a circular excavation, slightly in excess of the size required for the pier, is carried down to a depth of 5 feet, great care being taken to make the sides vertical and true to the circle Vertical planks, or lagging pieces, 5 feet long, having their edges slightly beveled, are set and held in place by two or more steel rings The

lagging pieces are wedged against the walls of the excavation by driving wedges between the rings and the plank The excavation is then made for another section, the lagging being put in and secured in the same manner, and the operation repeated until a suitable foundation bed is reached Depths of 100 feet have frequently been thus obtained This method is not applicable to running sand or to clay that is not solid enough to stand with vertical sides during the interval between making the excavation and placing the lagging In some cases the excavation has been carried past a layer of quicksand by using a cylindrical shell of steel forced by jacks through this layer to an underlying one of firm material But in general this method is dependent upon a continuous body of impervious material for its success.

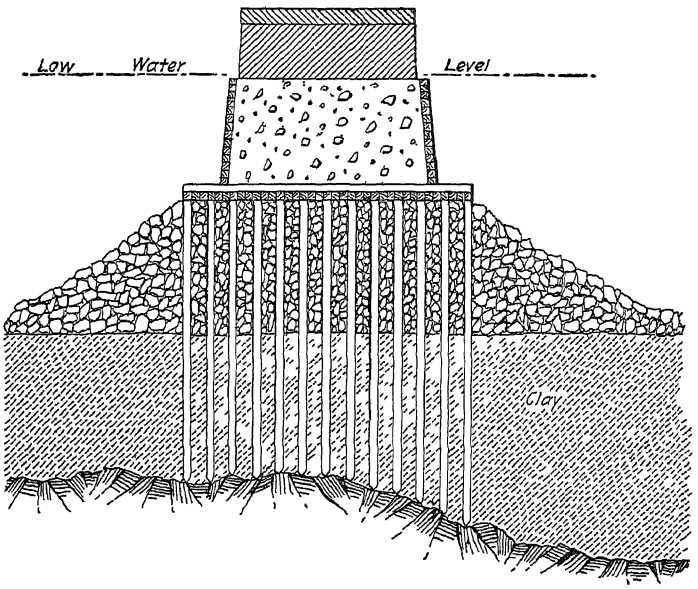


FIG 2 PILE AND CRIB FOUNDATION FOR A BRIDGE PIER

Cofferdams for Subaqueous Work. These consist of substantially water-tight inclosures surrounding the required space to be occupied by the foundation. After pumping out the water and excavating to the required depth the masonry or concrete construction can be made in the open air The construction of cofferdams varies with the existing conditions The usual type consists of a double line of sheet piling with the space between filled with puddled clay, but where the water is still and shallow a simple bank of earth or of bags of clay is often used. Such cofferdams may be used successfully only where they are not subjected to a high head of water

Box Caissons, or Cribs, are used where no excavation is required after the sinking of the box, and where the surface on which it is to rest may be prepared previously by dredging This type consists of a box open at the top and closed at the bottom It is generally built at some convenient point and partially filled with concrete or masonry, after which it is towed out and anchored in the correct position Additional concrete is then added, causing it to sink and to come to a bearing on the prepared surface To increase the bearing value of the foundation bed, piles are sometimes driven and the box caisson sunk on top of them, as illustrated by Fig 2 The bottom of the box is framed up of heavy timbers forming a sort of grillage and is often called a crib.

Open Caissons, as the term suggests, are open both top and bottom If a small amount of water is encountered, the excavation is made by men working inside the caisson, the water being removed by pumping or bailing If water enters freely, the material is removed by dredging through openings, or shafts, extending up through the concrete or masonry with which the caisson is filled The construction in either case is similar The inclosing sides, or walls, are built of wood, steel, concrete, or masonry, and are generally started on a frame, which is protected by a steel member projecting below the frame and forming a cutting edge to penetrate the soil slightly in advance of the excavation A heavy platform, or roof, is built above the cutting edge, the space below the roof being called the working chamber. On this roof the concrete or masonry construction is started. An opening, or "shaft," is provided for the entrance and exit of the workmen and for the

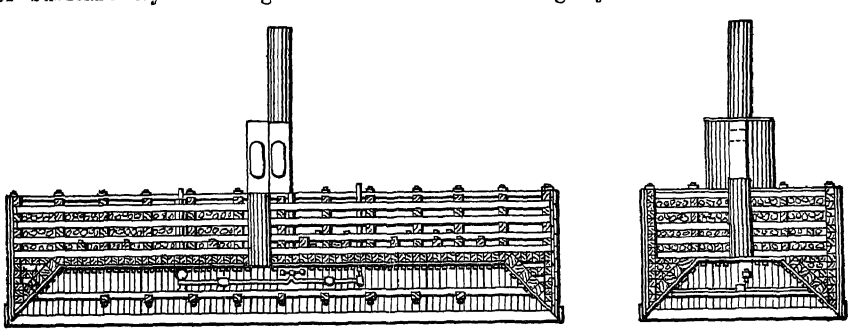


FIG 3 PNEUMATIC CAISSON FOR FOUNDATION OF A BRIDGE PIER
The air lock shown is of old style Note modern air lock in Fig 4

passage of a hoisting bucket used for removing the excavated material If dredging is used, there are a number of large openings through which the dredging is done, and the roof is often omitted altogether, the concrete or masonry filling being placed in pockets, or compartments, inside the caisson. In practice, the excavation is started before the concrete is carried up to its final height, after which the excavation and the building up of the pier progress simultaneously, the constantly increasing weight of the structure aiding the sinking of the caisson When the rock surface or other firm substratum is reached, the working chamber and shaft or the dredging wells are filled with concrete, making a complete pier from the foundation bed up to the required height When dredging is used, the concrete filling of the dredging wells must generally be placed under water, though it is sometimes possible to pump out the caisson and place the concrete without the interference of the water

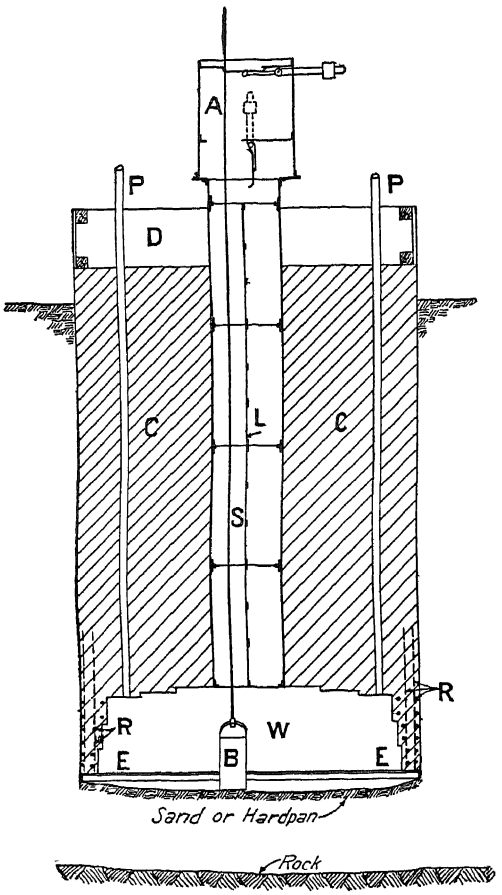


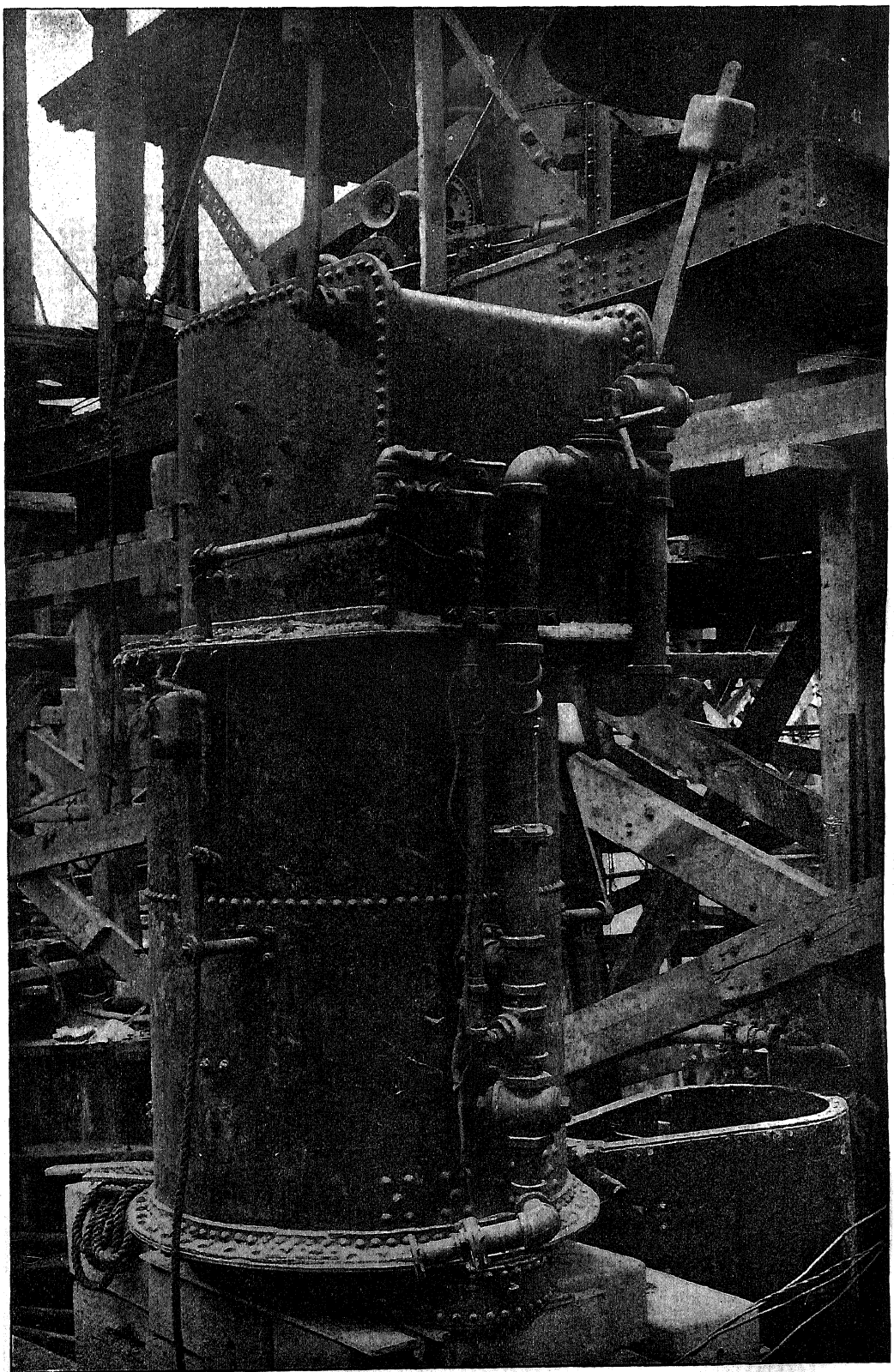
FIG. 4 TYPICAL PNEUMATIC CAISSON OF REENFORCED CONCRETE FOR FOUNDATION OF A BUILDING

E, E, cutting edge, *W*, working, or air, chamber, *R, R*, reenforcing rods, *B*, excavation bucket, *S*, shaft, *L*, ladder in shaft, *P, P*, air pipes, *C, C*, concrete, *D*, cofferdam, *A*, air lock

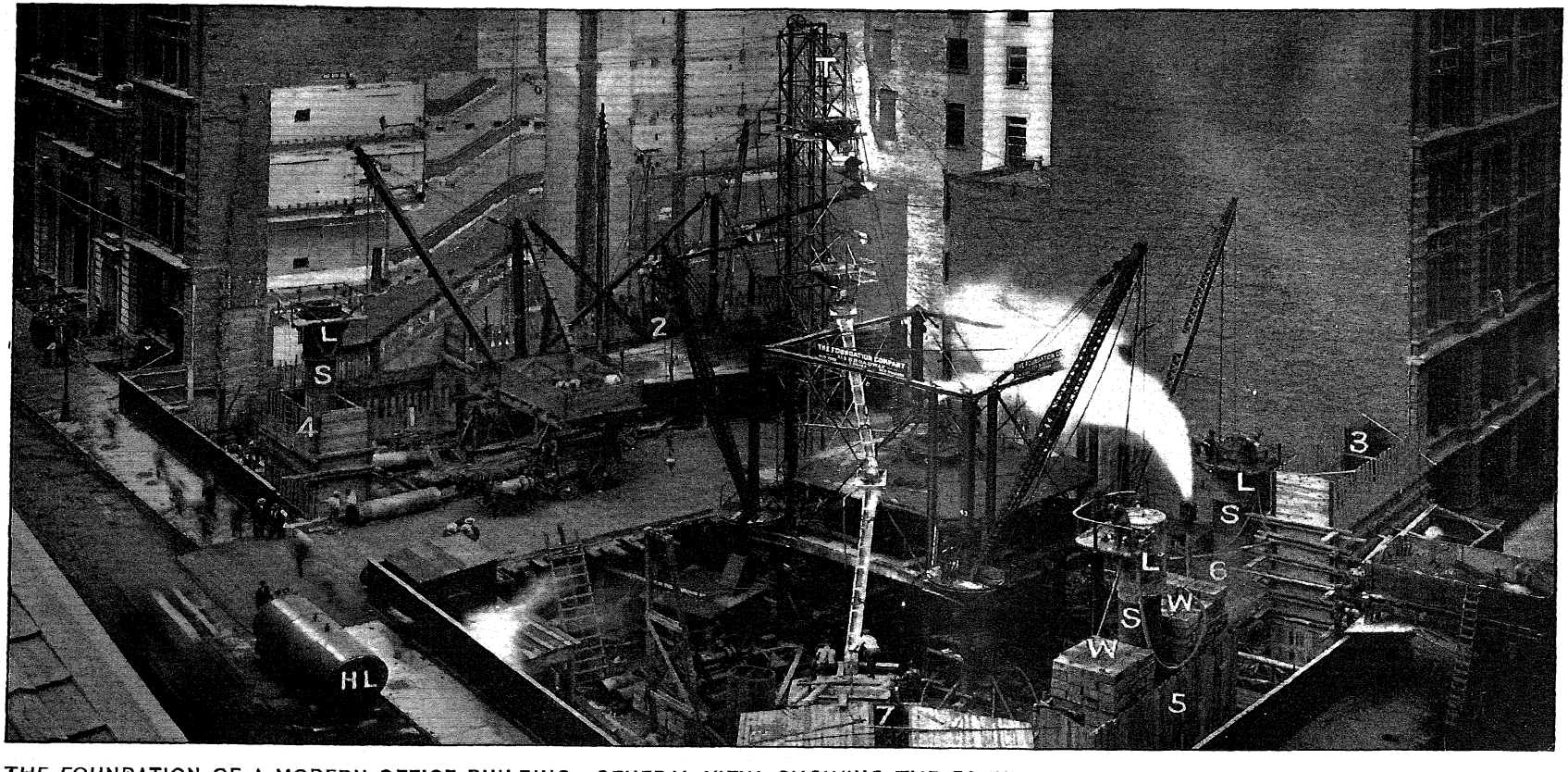
Pneumatic Caissons The construction is similar to that of the open caisson, greater care, however, being used to make the working chamber, roof and shaft, or opening from the working chamber to above the surface, air-tight On top of the shaft is a device called an air lock, which prevents the escapement of the compressed air from the working chamber, but permits the passage of men and materials It consists of an air-tight shell with a bottom and a top door When the bottom door is shut, the top one can be opened, allowing passage between the lock and the open air When the top door is shut, the bottom door can be opened, providing communication between the lock and the working chamber by means of the connecting shaft In principle it works the same as the water lock of canals The object of the compressed air is to prevent water entering the working chamber, enabling men to work in it as in a diving bell (See DIVING) The pressure of the air evidently must vary with the depth of the cutting edge below water level The men in the working chamber excavate the earth, which is hoisted in large buckets up through the shaft and through the lock, the caisson sinking as the excavation proceeds In river work the material is often blown out through a discharge pipe by means of the compressed air The caisson above the roof is usually filled with concrete, which not only makes the finished portion of the pier, but also gives the necessary weight to make the caisson sink, the concreting and excavating being carried on at the same time Additional weight is sometimes required, in which case pig iron or layers of rails are placed on top of the concrete When rock or other suitable firm material is reached, such material is cleaned and prepared by leveling or stepping its surface, and finally concrete is deposited and carried up so as to fill the air chamber with concrete packed tight against the roof, and then the shaft is also concreted The maximum air pressure in which men can work for short periods is about 48 pounds per square inch above atmospheric pressure, corresponding to a depth below water level of about 111 feet. The physiological effects of compressed air are often serious, pains in the joints, damage to the ear drums, and the so-called caisson disease render work at high pressure extremely hazardous The pneumatic caisson, however, is the only means (except the freezing process) of sinking piers through a great depth of water-bearing material in cities where the displacement of the soil caused by other methods would endanger the adjacent buildings

The Freezing Process has been used in the United States only for one or two mining shafts, but in Germany it has been resorted to in making excavations for foundations of buildings The method consists in driving steel pipes into the ground, which are closed at the bottom and are connected at the top by smaller pipes through which brine at an extremely low temperature is made to circulate The refrigerating effect results in freezing the water contained in the soil, converting quicksand to a frozen mass resembling soft sandstone The frozen ground acts as a cofferdam around the required area, and the material inside the frozen wall may then be excavated This method has the advantage theoretically of being applicable to excavations of any depth, but many precautions are necessary, and at the present time it is only in the experimental stage.

Special Construction. Many of the large buildings in New York City have a number of cellars, or substories, below the ground water level, necessitating a water-tight structure around them. In such cases a dam, or retaining



MORAN AIR LOCK FOR PNEUMATIC CAISSON



THE FOUNDATION OF A MODERN OFFICE BUILDING. GENERAL VIEW, SHOWING THE FOUNDATIONS OF THE J. P. MORGAN & CO. BUILDING, NEW YORK CITY, IN COURSE OF CONSTRUCTION

1. CONSTRUCTING WOODEN FORMS.
2. FORMING THE AIR CHAMBER, CONCRETE BEING DEPOSITED.
3. CAISSON AND COFFERDAM.
4. CAISSON AND COFFERDAM WITH SHAFT AND AIR LOCK INSTALLED.
5. CAISSON IN PROGRESS OF SINKING.
6. CAISSON SINKING COMPLETED, READY FOR CONCRETING AIR CHAMBER.
7. (Caisson behind superintendent's office.) CONCRETING THE SHAFT OPENING, THE AIR CHAMBER HAVING BEEN PREVIOUSLY CONCRETED AND THE AIR LOCK REMOVED.

L, L, AIR LOCKS. H L, HOSPITAL LOCK. T, GRAVITY TOWER FOR PLACING CONCRETE. W, IRON WEIGHTS TO AID SINKING OF CAISSON. S, S, SHAFTS.

wall, has been made by sinking rectangular pneumatic caissons to rock contiguously around the lines of the building, the caissons serving the double purpose of supporting the wall columns and of keeping out the water Foundations for the interior columns are made, on the completion of the dam and of the excavation to the depth of the lowest floor, by excavating in sheet pile boxes or pits down to rock or hardpan Sometimes, however, pneumatic caissons are also used for the interior column foundations, in which case the interior and the exterior caissons may be sunk at the same time It is necessary to have some clearance between the ends of adjoining caissons to allow for deviations in sinking, the usual amount allowed being from 4 to 18 inches These joints are made water-tight by filling them with clay or concrete

The following figures give the principal dimensions and other data of important pneumatic-caisson bridge foundations

NAME OF STRUCTURE	Size, feet	Depth below water, feet	Material
Eads Bridge, St Louis, Mo.	82 × 72½	109 7	Timber and iron
New York and Brooklyn Bridge	172 × 102	78	Timber
Forth Bridge, Scotland	70 diam	96	Iron
Havre de Grace, Md	78 2 × 42 3	76	Timber
Alexander III Bridge, Paris	144 × 110	27	Steel
St Louis Municipal Bridge	90 × 33	112	Timber
New Quebec Bridge	180 × 55	100	Timber

Among other deep excavations made by the pneumatic process may be mentioned the mine shaft near Deerwood, Minn., which was sunk to a depth of 123 feet below ground water level and is the greatest depth ever attained by this method One of the caissons of the Municipal Building, New York, was sunk 112 feet below water level and is the deepest foundation for a building where compressed air was used

The following list gives a few examples of foundations of high buildings in New York City:

NAME OF BUILDING	No of stories	Type of foundations
90 West Street	23	Wood piles
Park Row	26	Wood piles
Produce Exchange Bank	12	Concrete piles
St Paul Building	25	Steel grillage
Woolworth	55*	Pneumatic caissons
Singer	45*	" "
Adams Express	32	" "
Equitable	36	" "
Bankers Trust Company	29	" "

* Including tower

NOTABLE EXAMPLES OF FOUNDATION WORK

In the preceding paragraphs the various methods of constructing foundations have been very briefly described To illustrate the application of these methods in actual work, a few notable examples of foundation construction will be described

Williamsburgh Bridge. The four suspension cables for this structure are carried by steel towers resting on masonry pedestals founded on pneumatic caissons Each tower has two groups of four legs each, and each group of legs is carried by a separate pedestal and caisson foundation The caissons for the Brooklyn tower were built of timber and were sunk 97½ feet apart, centre to centre, and with their longer sides parallel Each structure consisted of a pneumatic caisson and a cofferdam surmounting it, the whole forming a rectangular box 63 × 79 feet The roof of the working chamber was 7½ feet above the cutting edge, and the space above it to the top of the caisson was filled with timber cribwork, with suitable wells left for exit from and entrance to the working chamber The caisson for the south pier or pedestal was sunk to a depth of 107½ feet below water level After sinking, the entire working chamber and all the open spaces in the caisson proper were filled with concrete The stone masonry of the pier began on top of the caisson

Poughkeepsie Bridge The bridge across the Hudson River at Poughkeepsie, N Y., was founded by first sinking open caissons, by dredging through interior wells, and then sinking box caissons on top of the open ones The largest caisson sunk was 100 feet long, 60 feet wide at the bottom, 40 feet wide at the top, and 104 feet high. It was divided by one longitudinal and six transverse walls into 14 compartments The outer walls and the longitudinal interior walls were made wedge-shaped and solid for a height of 20 feet, and above that they were hollow The gravel used to sink the caisson was deposited in these hollow walls The dredging was done through the 14 interior compartments, and when hard bottom was reached at a depth of 134 feet, the wells were filled with concrete deposited under water

Hawkesbury Bridge. The foundations for this bridge, built over the Hawkesbury River, near Sydney, Australia, also were made with open caissons with dredging wells The caissons were built of steel plates with longitudinal and cross braces and were oblong in plan with rounded ends, the length being 48 feet and the width 20 feet. There were three dredging wells, 8 feet in diameter, terminating at the bottom in bell-mouthed extensions, which met the cutting edge The spaces, or pockets, between the wells and sides of the caisson were filled with concrete, and additional sections of steel added to the sides, as the caisson sank When firm bottom was reached, the wells were also filled with concrete, and the pier masonry started on it at a depth slightly below water These foundations are noted as being the deepest which have ever been sunk, the maximum depth attained being 162 feet below water It is proposed, however, to sink the foundations of the new Sydney Harbor bridge to the depth of 170 feet below water

Kingsbridge Power House. In constructing the power house for the Third Avenue Railway in New York City a pile foundation with a concrete platform was constructed, having lateral dimensions of 256⅓ × 319⅓ feet At the site of the foundation a bed of fine sand overlaid solid rock at a depth of over 100 feet A cofferdam of sheet piling was constructed entirely around the foundation The bearing piles were driven 2 feet, 4 inches apart under the boiler house and 2 feet, 6 inches apart under the engine house This spacing refers to the piles inside the first row around the entire building. The piles in this first row were driven close together and with a slight slant outward and downward This arrangement was adopted to

aid the sheet piling in confining the sand The inner bearing piles were all driven vertically by the water jet The tops of the piles were cut off at a uniform level of 6 inches above the bottom of the excavation and were capped with a layer of concrete 7½ feet thick or 7 feet thick above the tops of the piles This concrete cap was a solid monolithic structure

Auditorium Hotel The Auditorium Hotel in Chicago rests on a platform foundation of timber 2 feet thick, covered with a layer of concrete 5 feet thick, in the concrete are embedded layers of railway rails and of I beams The area of the foundation is 60,000 square feet

The J P Morgan and Company Building The foundations of this building, constructed in 1913, are a good illustration of modern methods of pneumatic caisson work. The building is on the southeast corner of Wall and Broad streets, New York City At this site bedrock is of irregular formation, from 53 to 72 feet below the street, and ground water level is 15 feet below the curb. On top of the rock there is a layer of hardpan from 4 to 23 feet thick and above this quicksand extending to the surface The plans provided for three substories, the lowest floor being 50½ feet below the street, necessitating the water-tight dam construction The lot is somewhat irregular in shape, with main dimensions 156 × 113 feet It is adjoined on the south and on the east by the Mills Building, the foundations of which are spread footings resting on quicksand, and it was necessary to provide against their settling during the sinking of the adjacent caissons, as even the pneumatic method under such circumstances will cause some movement of quicksand For this purpose 19 cast-iron cylinders, each made up of sections 4 feet long and 3 feet in diameter, were sunk to rock under the walls of these buildings at intervals of 10 to 15 feet Niches were cut through the footings and up into the walls high enough to allow placing the first section of a cylinder. As the excavation inside the cylinder was made, the section was forced down by means of jacks Another section was then placed on top of the first one and bolted to it, and the operation repeated till rock was reached The cylinder was then filled with concrete, and the wall loads transferred to it by means of steel wedges Compressed air was used during the sinking operation, each cylinder being in fact a small pneumatic caisson. The caissons forming the dam were 7 feet wide and from 16 to 29 feet long They were made entirely of reenforced concrete except the cutting edge, which was of steel At each end a semihexagonal opening was left in the concrete to subsequently form a key with the adjoining caisson The caissons were sunk entirely around the lot, with intervening spaces of 18 inches between ends After the caissons were sunk, these spaces were closed off by driving wooden sheet piling on the inside and on the outside line of the caissons, the sheet piling lapping the ends of the caissons by a few inches The upper wooden forms of the caisson ends were then removed, making a hexagonal opening between caissons A section of shafting was then concreted into this opening, and an air lock bolted to the top of the shaft After applying air pressure the lower wooden forms of the caisson ends were taken out, the quicksand in the opening removed, and the opening entirely filled with concrete On the completion of the dam the inclosed space was excavated down to hardpan, or slightly below the lowest story floor line, and the foundations for the interior columns were made by open pits through the hardpan down to rock As the excavation progressed, series of horizontal timber struts were placed extending across the lot in both directions, and wedged against the sides of the caissons to maintain the stability of the dam till the permanent floors were built A good idea of the conduct of the work is shown in the illustration A typical section view, in outline, of the caissons is given, and a picture of a modern air lock is shown in the accompanying plate

Bibliography The preceding paragraphs give only a bare outline of foundation construction, the great variety of methods and conditions of such work making a full treatment possible only in special treatises Among the best books on foundation construction consult Patton, *A Practical Treatise on Foundations* (New York, 1893), Baker, *A Treatise on Masonry Construction* (2d ed, ib, 1906), Fowler, *Practical Treatise on Sub-Aqueous Foundations* (3d ed, ib, 1914), Jacoby and Davis, *Foundations of Bridges and Buildings* (ib, 1914), Kidder, *Architects' and Builders' Pocket-Book* (16th ed, ib, 1914)

FOUND'ER (from ME *foundren*, to founder, from OF *fondrer*, to sink, from *fond*, Lat *fundus*, bottom), or LAMINITIS Inflammation of the vascular sensitive laminæ of the horse's foot It is rarely met with in cattle or sheep, owing to the corresponding structures being in them much less developed Occasionally the laminæ are strained from severe exertion, more frequently they suffer from the morbid effects of cold, which is especially injurious after the excitement and exhaustion of labor Very commonly also they become inflamed from their close sympathy with diseases of the digestive organs, often following engorgement of the stomach, or inflammation of the bowels All four feet are sometimes affected, more usually the fore pair only The feet are hot and tender, the animal stands as much as possible upon the heels, trembles and groans when moved, and is in a state of acute fever and pain Except when following superpurgation or internal disease, bleeding is useful The shoes must at once be removed, and the toes, if long, reduced, but no further rasping or cutting is permissible The affected feet should be kept in a tub of water at a temperature of 45° F or wrapped in cloths wet with cold water. Soap-and-water clysters, repeated if necessary every hour, usually suffice to open the bowels, which are very irritable Physic, if required, must be used with extreme caution Two drams of aloes is an ample dose in cases of founder The strain should be taken off the inflamed laminæ by getting the animal, if possible, to lie down, or, where this is impracticable, by suspending or supporting him in slings When the inflammation continues so long that serum and lymph are poured out between the sensitive and horny laminæ, free exit for the same must be provided by making an opening through the toe with a small drawing knife This may prevent the pumiced and disfigured feet that are apt to follow severe and repeated attacks After the acute symptoms pass, cold applications to the feet and a mild blister round the coronet help to restore the parts to their natural condition. Consult V Shaw, *Encyclopedia of the Stable* (New York, 1913)

FOUNDER OF PEACE A title given to St Benedict

FOUNDERS AND PATRIOTS OF AMERICA, ORDER OF An hereditary patriotic society organized in New York City in 1896. The objects of the order are the association of those whose ancestors struggled together when the United States was a new country, the teaching of a reverent regard for the character of the founders of the country, and the preservation of records relating to the first colonists, their ancestors and descendants It admits lineal descendants of an ancestor who settled in any of the Colonies prior to May 13, 1657, and whose subsequent ancestors were loyal to independence The National Society consists of representatives of the State societies in New York, Pennsylvania, Connecticut, New Jersey, and Massachusetts, and holds annual meetings on the anniversary of the settlement of Jamestown It has published valuable monographs on early Colonial history The membership (1914) is about 500.

FOUND'ING, or METAL CASTING The art of forming in loam or sand a mold of any given design which is subsequently filled with molten metal and the latter allowed to solidify The resultant casting is a copy in metal of the design or model furnished The place in which these operations are performed is called a foundry. Foundries are distinguished by either the metals employed or the class of castings made, as iron, malleable castings, steel, brass, statue, type, bell foundries, etc. The variations of working in founding are so numerous that it is possible here to describe even briefly only the general process of iron founding and a few more important special processes for producing certain kinds of castings

Iron Founding may be divided into three operations (1) the making of the mold, (2) the melting of the metal, and (3) the pouring of the molten metal into the mold The making of the design or model, which is usually called the pattern, is not strictly a part of founding, although in most instances foundries have pattern shops working in conjunction with them as a part of the same plant Wood patterns are by far the most numerous, although the modern tendency is entirely towards metal patterns, iron, aluminium, or brass being preferred The molding is usually done in sand or in loam, the great bulk of commercial iron castings being produced in sand molds Every mold must consist of at least two parts in order that the pattern may be

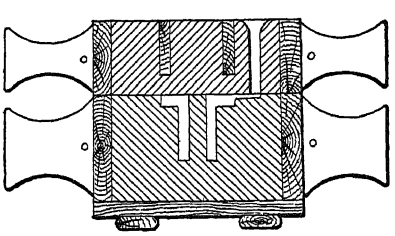


FIG 1 SECTION OF FOUNDRY FLASK AND MOLD

removed When the desired casting is of complicated form, the pattern is usually made in several pieces so joined that they may be removed one at a time The process of molding in sand, using flasks, is, briefly stated, as follows The lower flask, called the drag, is filled with sand, and the lower half of the pattern embedded in it The upper flask, called the cope, is then placed in position on the lower, and sand is rammed tightly around the upper half of the pattern The pair of flasks is then turned bottom up, and the sand, first loosely placed in

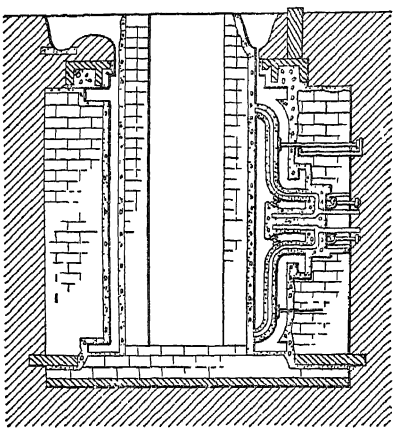


FIG 2 SECTION OF MOLD ARRANGED FOR CASTING A STEAM-ENGINE CYLINDER

the drag, is removed and replaced by firmly packed fresh sand The pair of flasks is then reversed to their original position, and they are parted along the line of juncture, the pattern remaining in the drag and the mold of its upper part remaining in the upper flask or cope After removing the pattern from the drag and finishing up the imperfections in the mold by hand, the two flasks are again placed in position, and the metal is poured through suitably formed holes or gates The mode of procedure just described is greatly varied in detail, but its essentials remain the same. For example, the bottom flask is often dispensed with, the lower half of the mold being formed or "bedded in" the sand floor of the foundry, while the upper half of the mold is formed in a flask, as when a pair of flasks are employed. Usually the pattern is parted at the middle, one part remaining in the drag and one in the cope to be separately removed If the casting is to be hollow, a core of the proper form is suspended in the mold previous to restoring the cope to its position on the drag These cores are commonly made of sharp sand mixed with linseed oil or flour and baked Two varieties of sand molding are employed—green-sand molding and dry-sand molding The essential difference is that in dry-sand molding the flasks, after the mold is finished, are placed in a drying oven and thoroughly dried Molds in dry sand admit of exceedingly large and intricate castings being made with much less risk than in green sand

Loam molding, which is gradually being replaced by dry-sand molding as our foundries are being better arranged for drying molds on a large scale, differs from sand molding in that the molds proper are not contained in flasks or bedded in the floor, but are constructed in sections composed of rings, plates, and brickwork To illustrate loam molding the comparatively simple process of casting a cylinder will be described. A hollow core of iron or brick is first erected and plastered outside with a layer of loam—mixed sand and clay—to the exact inside dimensions of the cylinder. When the loam

coating is dried, it is washed with a mixture of charcoal and water A layer of loam is then added which is laid on and finished off to the exact thickness and exterior form of the cylinder to be cast This is then dried and washed, as was the core Around this thicknessing, as it is sometimes called, is built a shell of brickwork a few inches larger than the thickened core, and the annular space is rammed full of loam When dried, this shell is lifted by a crane and the thickening removed from the core The shell or cope is then replaced, and there is an annular space left between it and the core, exactly the dimensions and shape of the thickening This space is the mold into which the molten metal is poured This is almost exactly the process of bell casting See BELL

The iron is melted in a cupola, or foundry furnace, which consists essentially of a short iron cylinder mounted on iron columns and lined with fire brick, and of a belt or wind box surrounding the cupola near the bottom, from which several pipes or nozzles, called tuyeres, extend into the cupola to give entrance to the air blast Cupolas vary in diameter from 2 to 10 feet They are cylindrical for a portion of their height, and then conical, to form a chimney At the top of the cylindrical portion is placed the charging hole, and at the bottom are one or two breast holes for raking out the cinders, and a tap hole through which the molten metal is drawn The molten metal is run into ladles, which are iron vessels lined with some refractory substance, and provided with a lip for directing the metal into the mold in pouring

The preceding paragraphs describe very briefly the general process of making iron castings, the following are the special methods adopted in making certain forms of castings which are used in large quantities, such as car wheels, cast-iron water pipe, kettles, ordnance, and statuary The casting of car wheels varies from the general process described only in having an iron ring for that portion of the mold which forms the thread This iron ring has the effect of suddenly cooling the metal forming the thread and thus rendering it more dense and hard This hardening process is called chilling and is employed in making rolls and other articles which require a hard wearing surface Water pipe is cast vertically in cast-iron casings having the core on a barrel The pattern is inserted in the casing, and the annular space between it and the casing is rammed full of sand The pattern is then removed and the core inserted in its place In casting kettles the core corresponding to the inside of the kettle is molded bottom up on a bare plate A thickening of sand of the exact thickness and exterior form of the kettle is then added to the core A cope is then built around the thickened core and when dry is removed to allow the thickening to be broken away, after which it is replaced and the metal poured All cast-iron hollow ware, pots, pans, etc, are cast in substantially the same manner

Statue founding is much similar, except that the thicknessing of the pattern in bronze casting is made of wax, which is melted out by heat without lifting the cope Small statuary casts of lead, tin, zinc, and their alloys are made by pouring the metal into iron molds and, after due time has been allowed for a skin to congeal on the surface, inverting the mold and allowing the molten inside metal to run out Iron statues are founded like kettles or bells, with a core thicknessing of sand or loam and with the cope made in sections to permit removal Type is cast in metal molds at the ends of which is the matrix for forming the letter In modern type foundries the process is a mechanical one, performed automatically by type-casting machines.

Cast ordnance is now seldom made, but the process of producing such castings calls for a brief explanation Bronze and cast-iron cannon are cast in loam molds The founding of a Rodman gun, which, while now long obsolete, was the most recent form of cast gun, is as follows The mold is of dry sand contained in circular sectional casings The chief feature is the core barrel, which consists of a water-tight cast pipe or barrel with flutes on its exterior surface along its whole length to permit the gas to escape upward from behind the hemp and loam with which the barrel is coated After the mold has been closed together, the barrel is attached to a spider or tripod, the legs of which rest upon the top flange of the casing, adjusting screws at the end of each leg permit the accurate centring of the core in the mold A pipe extends down the centre of the core, through which water is forced and escapes by rising through the annular space between the pipe and the inside of the core The purpose of this process is to cool the gun casting from the inside outward In casting a 15-inch gun the water pipe and core are removed in about 24 hours, and afterward a current of cool air is forced into the bore of the gun, which is cool enough to remove from the mold in about 9 or 10 days The water-cooling method described here is very useful in making complicated steam-engine frames and cylinders as well as steam turbines

Molding machines are made in a great variety. One of the most important classes comprises machines for molding cast gear wheels The latest achievement is the development of the "jarring" molding machine, in which flask, sand and pattern are "bumped" on a solid anvil by compressed air The result is that the sand is packed about the pattern much faster and better than by hand, and an enormous saving is effected in labor and time Castings 8 to 12 tons in weight are now made this way The molding machine is gradually replacing manual labor for all repetition work, as it is cheaper and better than hand work Even such intricate castings as automobile cylinders are now made by specially designed molding machines

Bibliography For a full description of founding processes and tools, consult Bolland, *The Iron Founder* (New York, 1892), id, *The Iron Founder Supplement*, and id, *Encyclopædia of Founding* (ib, 1893), West, *American Foundry Practice* (ib, 1882), id, *The Molders' Text Book* (ib, 1886), Dingey, *Machinery Pattern-Making* (ib, 1892), Sharp, *Modern Foundry Practice* (ib, 1900), Tate and Stone, *Foundry Practice* (Minneapolis, 1904), Hand, *Pattern-Making and Foundry Practice* (Chicago, 1905), Bale, *Modern Iron Foundry Practice* (London, 1902), Moldenke, *Production of Malleable Castings* (Cleveland, 1911), Hall, *The Steel Foundry* (New York, 1914)

FOUNDLING HOSPITAL, or ASYLUM An institution for the care of children, particularly infants that have been abandoned by their parents or guardians In modern times the great majority of children in foundling hospitals are not foundlings, but are (1) illegitimate children

brought to the institution by the mothers or their friends, (2) legitimate children whose mothers, because of desertion of husband, poverty, or other causes, feel unable to care for them, and (3) a few orphans

The first foundling hospitals were introduced by the Church to prevent infanticide In the sixth century the Bishop of Treves permitted children to be placed in a marble basin before the cathedral, with the understanding that members of the Church would care for them The capitularies of the Frankish kings mention foundling hospitals The first well-authenticated establishment was founded at Milan in 787 AD, the Council of Nicæa in that year having ordered that each city should have an institution for abandoned children A foundling hospital was organized at Montpellier in 1070, Embeck, 1200, Rome, 1212, Florence, 1317, Nuremberg, 1331, Paris, 1362, Vienna, 1380 For the care of children above the age of infancy, see DEPENDENT CHILDREN

The number of foundling hospitals in France was greatly increased through the labors of St. Vincent de Paul and of Colbert in the seventeenth century After 1789 the French Republic assumed the charge of foundlings The children were at first publicly received, but by a decree of 1811 there was introduced into foundling hospitals throughout the Empire a revolving cradle "tour," so arranged that the person who deposited a child in the cradle could not be seen from within The person was then able to turn the cradle so that the child would be brought within the institution This was introduced on the ground that thereby child murder would be lessened Whether infanticide was materially decreased is not known, but the unexpected and immediate effect was a great increase in the number of children abandoned The number left at foundling hospitals in 1784 is stated to have been 40,000, in 1815, 68,000, and in 1834, 134,000 Other countries had similar experiences In 1834 a parliamentary commission reported that the influence of the tour was pernicious, and it was gradually abolished With the abolition of the tour a marked decline in the number of foundlings took place

At present the public foundling hospital in France serves merely for the temporary care of the infants Every attempt is made to discover the identity of the mother If found, persuasion is employed to induce her to take back the child, if she is in need of support, public aid is promised her When the mother cannot be found, or if she will not take the child back, a place is found for it in a private family, where it is nursed and cared for during the period of infancy A similar system is in vogue in some of the German cities, notably Leipzig This system has not only greatly diminished infant mortality, but has very materially diminished the number of children abandoned

In Vienna foundlings are cared for in a hospital Mothers who wish to leave children in the institution are required to serve in the hospital as nurses for a period of three months The system provides for the nursing of children whose mothers are not found Moreover, after caring for her child for so long a period of time, the mother is less inclined to leave it if it is possible for her to keep it The system has been found to yield very satisfactory results

About 1741 the Foundling Hospital of London began to receive children. It was established by Thomas Coram, a benevolent sailor, who donated 56 acres of land, which now yield in annual rents more than the original purchase price of £5500 At first applications for admission were so numerous that the children admitted had to be chosen by lot Fifteen years later Parliament gave financial assistance, and all the children deposited in a basket outside the gate were cared for This system led to such serious abuses that the authorities decided to take charge of only those children who were accompanied by the sum of £100 In 1801 the present form of organization was adopted A child is admitted only after a careful personal examination of the mother has shown that it is illegitimate and the first born, and that the mother has never lived with the father Preference is given in cases where the mother has been deceived by a promise of marriage The hospital is rich and well managed and takes good care of its foundlings.

In America the county poor farm was the only place at first provided for foundlings In some places there is still no other public provision Foundling hospitals, however, are now to be found in all the larger cities Nearly, if not all, the foundling hospitals are under private management, but many of them receive subsidies from public funds "Baby farms" is the name applied to those places where babies are boarded for the sake of the gain In most cities there is no inspection of such establishments, in spite of the fact that the system is known to give rise to frightful abuses

The death rate in foundling hospitals frequently ranges from 90 per cent to 100 per cent, and an average of 75 per cent is common. The experience of European institutions is identical The better institutions now recognize this evil and seek to avoid it by having the mother who wishes to leave a child in the institution stay and nurse it and another child also if possible In the Chicago Foundlings' Home, where this rule is practically enforced, the death rate is very low Where this plan is impracticable, the New York Foundling Asylum and others have adopted the plan of placing the infants at board in selected private families Those receiving the children must comply with the detailed rules of the institution Medical care is furnished, and a careful system of visitation is maintained The children are later recalled to the institution and are finally placed in homes

Another objection to the present system is that the preliminary investigations are insufficient, so that many children are received who are not properly subjects for charity Very few foundling hospitals make any further investigation than to question the one bringing the child

In Massachusetts foundling hospitals have been abolished by law It is forbidden to board more than two infants under two years of age in any family unless that family has a license given after thorough investigation, the license stating the number of children allowed The State Board of Charities has a department for the children, who are boarded out in families

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der Findelanstalten (Prague, 1882), Sennichon, *Histoire des enfants abandonnés* (Paris, 1880), Benedict, *Waifs of the Slums* (2d ed, New York, 1907), Gorst, *Children of the Nation* (ib, 1907), Bodine's *Reference Book on Juvenile Welfare* (Chicago, 1913)

FOUNDRY See FOUNDING

FOUN'TAIN (OF *funtaine, fontaine*, Fr *fontaine*, from ML *fontana*, from Lat *fons*, spring, connected with Gk χεῖν, *chein*, Skt *hu*, to pour, AS *gēotan*, Icel *gjota*, OHG *giozan*, Ger *giessen*, to pour) A natural or artificial spring or source from which water gushes, spouts, or falls into a basin or series of basins When water is led from a reservoir through a pipe to an orifice suitably placed at a lower level, it will spout upward to a height a little less than that of the level in the reservoir. This is the principle applied in most jet fountains, as in the famous "Grandes Eaux" at Versailles, fed from reservoirs at Marly Where a suitably elevated source is not available, the necessary hydraulic pressure for producing jets is obtained by means of force pumps In southern and eastern countries where water is not abundant, both natural and artificial sources of supply have in all ages been treated with special care and often adorned with artistic elegance In the ancient world religious devotion to the deities of water, especially of curative mineral springs, was an added incentive to such treatment The earliest preserved examples are a large stone basin carved in relief with figures, found in the royal palace at Tello (3000 B C), and an Assyrian fountain at Vavian, sculptured in the face of the rock itself, where two affronted lions rest their forepaws on the mouth of a vase from which the water spouts into a series of basins cut in the rock

The ancient Greeks made little display of the flow of water, but gathered it into basins over which were erected pavilions or colonnaded porticoes The Greek vases also show a type of small open fountains with water spouting from the mouths of lions or boars set in the upper part of a central column through which the water supply was carried The city of Corinth was rich in fountains That of Pirene, mentioned by Herodotus and excavated by the American Classical School of Athens under Richardson, contained a number of cells from which the water flowed into an open basin In another fountain the water flowed from the hoofs of the horse Pegasus The Fountain of Glauce, inclosed in the Odeum, was dedicated to Glauce because she was said to have thrown herself therein, believing that its waters would counteract the poisons of Medea Another Corinthian fountain had a bronze statue of Neptune standing on a dolphin from which the water flowed

Among fountains famous for their architectural treatment were those of Megara and Lerna Mystical qualities, as well as supernatural origins, were ascribed to fountains, and they were often connected with temples and shrines Salt springs were sacred to Poseidon, many curative springs to Æsculapius and Hygieia The famous Enneacrunos Fountain at Athens was called Callirrhoe before the time the water was drawn from it by the nine spouts from which it took its later name The fountain in the Temple of Erechtheus at Athens was supplied by a spring of salt water, and a similar spring supplied that in the Temple of Poseidon Hippias at Mantinea Above the Heræum of Argos, the centre of Argive worship, was the famous Asterion Fountain Often the Greeks made rock excavations to capture the water at its source Among the most notable of these were that near Syllium in Pamphylia, which still remains, that near Larnaca in Cyprus, and the Burinna Fountain near Cos, covered with a dome Among the famous fountains consecrated to Apollo were the Castalian Fountain and the Cassotis at Delphi, connected with the oracle, vapor and gas in the water contributed to the cult The importance attached by the Romans to an abundant and hygienic water supply is attested by the grand scale of their hydraulic engineering and by the ruined aqueducts (q v) which cross the Campagna These supplied the baths and the public fountains, which were of large size and numerous When Agrippa reorganized under Augustus the city's water supply, he made or restored 700 fountains, decorating 400 with marble columns and 300 with statues of marble or bronze The two chief types of Roman fountains were the *niche* fountain, set in a wall, with spouts, often representing heads, shells, or dolphins, discharging into a basin and the *open* fountains, set in open spaces, with jets or spouts above one or more circular basins No Roman fountains exist today even approximately intact, but fragments of their sculptured decorations have survived, e g, a marble rhyton in the Palazzo dei Conservatori at Rome, and figures of Tritons, river gods, etc Pompeian wall paintings have also preserved for us pictures of various garden fountains of the second type They were an important element in both the economy and decoration of Roman villas and country houses Not the least interesting of the Pompeian discoveries are the public and private fountains of that provincial town The public fountains were comparatively simple, with little or no ornament except a carved head serving as a spout, but the private fountains display considerable variety, both of form and decoration The most beautiful are the niche fountains wholly incrusted with brilliant mosaic of colored glass and shells Especially interesting are those of the Casa della grande fontana and the Casa della piccola fontana a mosaico, and those of the Casa del Centenario and of the Casa di Lucrezio In 1880–81 a particularly beautiful one was found, decorated with a statuette of Silenus and with mosaics of the Birth of Venus and the Bath of Venus and the Loves Not only did simple running fountains exist, but the remains of jet fountains have been found, and a drawing exists representing a vase with a double jet of water, standing on a pedestal placed in what is supposed to have been the impluvium of a house Public fountains were a feature of every Roman city, and interesting examples have been found in Algiers, as at Thamugadi (Timgad) and Cuiculi (Jamila) The Romans were from the earliest times quite as devoted as the Greeks to the cult of sacred springs and to their deities, such as Juturna, Picus, and the nymph Egeria, whom legend made the inspirer of King Numa The discoveries of votive offerings at mineral and other springs show the cults to have been continuous from the Royal to the Imperial period

As among the Greeks and Romans, so with the early Celts and other northern tribes, traces of superstitious beliefs and usages with relation

to fountains can be traced in monumental and legendary remains Miraculous virtues are still attributed to certain ancient fountains in Brittany, to which the country people repair with offerings The Christian missionaries, finding themselves unable to eradicate the superstitions which ascribed miraculous power to rocks and woods, streams and fountains, connected with the divinities of the old religions, changed their form and direction by dedicating these objects to the Virgin and saints, so making the force of the old belief an instrument for its own overthrow Fountains were attached to the new religion by the erection of statues of the Virgin or of saints upon the possibly rude structures that collected the water and preserved its purity There is some uniformity in the architectural characteristics of these structures during the Middle Ages A very common form in rural districts was that in which a large basin, reached by descending steps, received the water This basin was covered by a vaulted shelter, often adorned with molded arches and sculptured figures and escutcheons The fourteenth-century Fontaine Joubert at Poitiers (restored 1597) was such a fountain, with a niche, bench, and sunken basin Many such fountains are found in Brittany, and elsewhere throughout France A form more common in populous districts was that of a large open basin, round, square, polygonal, or lobed in form, with a columnar structure at the centre, from the lower part of which it was arranged that spouts should issue, playing into an open basin and supplying vessels brought for the purpose in the cleanest and quickest manner To this general type belong the unrivaled group of mediæval fountains at Viterbo (Italy), in which the central shaft, bearing lion's-head spouts, usually rises from the lower basin and carries a second, much smaller basin on its capital, with a smaller and shorter central shaft supporting a third basin crowned by a pinnacle In the Gatteschi Fountain the two upper basins are quadrilobed, and the lower one is cruciform They are always raised on a stepped platform and stand in the centre of squares

In some of the later Gothic fountains the central column is replaced by an elaborate Gothic structure like a spire At Rouen the Pucelle Fountain (fifteenth century) has an elaborately sculptured pinnacle The most exquisite of all Gothic fountains is in Germany, the Schone Brunnen at Nuremberg, a high polygonal structure like a cathedral tower, a mass of tracery and sculpture (fourteenth century) In the public market place at Brunswick is a fountain of the fifteenth century, of which the central structure is made of bronze Except in Italy, few fountains are of earlier date than the fourteenth century The Italian fountains of the Gothic period are, however, numerous and beautiful, some even belong to the late Romanesque age The most monumental of these are, perhaps, three situated at Siena the Fonte Branda, which has been celebrated by Dante, built in the twelfth century, the Fonte Nuova, built in 1259; and the Fonte Gaja, constructed in 1419 This Sienese type was a large rectangular basin, with a solid wall on three sides At the Fonte Branda the covering brick structure is 30 feet high, with three groined vaults, battlements, corbels, and blind arches were its main decorations, but terra-cotta ornamentation is used already in the Fonte Nuova, while pilasters, with bas-reliefs and statues in niches by Giacopo della Quercia and other famous sculptors, decorated the Fonte Gaja, one of the most beautiful in Italy Of equal beauty is the Fontana Maggiore at Perugia, one of the finest works of Niccolò of Arezzo and Giovanni Pisano (c 1300). It is a 24-sided polygon, four concentric steps lead up to a lower basin, 30 feet in diameter, each face decorated with fine reliefs, separated by grouped colonnettes, from the water of this basin rise 24 columns supporting the upper polygonal basin, whose angles are marked by statuettes In the centre of this basin is a heavy bronze column supporting a bronze basin upon which a group of three water nymphs now stands.

During the Renaissance the designing of fountains became an important and almost a distinct branch of art, combining in one design the resources of architecture, sculpture, and landscape decoration Fountains were no longer confined to public squares and purposes of utility, but took their place also in the elaborate decorations of the gardens and parks of the villas or palaces of the great and wealthy This development began in the villas erected during the middle and late Renaissance in Italy, was carried into France, where in the seventeenth century it culminated in the grandiose water effects of Saint-Cloud and Versailles, and spread into Germany and the rest of Europe England has in general neglected this branch of decorative art, and its chief centres outside of Italy have been in France and in the capitals of the various states of Germany

In the Italian villas of the sixteenth and seventeenth centuries water became an essential element of the garden designs, always in connection with a monumental treatment of architectural or sculptural accompaniments, to which the leading artists of the time often devoted their talents. Two types chiefly prevailed —the cascade, in which a moderate volume of water was made to produce a maximum of effect by falling in thin but brilliant sheets over multiplied obstructions—steps, basins, rocks, etc —always in a framework of architecture with abundance of sculptured accessories, and the isolated or central fountain, in which one or many jets spouting upward fell into the highest of a series of superposed *vasques*, or bowls of marble or bronze, and thence into a larger one below, and so on into a broad basin on the ground level Of the former type, the most extensive example is the series of cataracts in the Caserta Palace gardens near Naples, by Vanvitelli (1753), but notable examples of equal or higher artistic merit are those of the Villa Lante, near Viterbo (Vignola, 1540–50), of the Villa d' Este at Tivoli (Fontana, 1580–?), and of the villas Torlonia-Conti, Aldobrandini, and Mondragone at Frascati

The superposed-basin type is seen in numerous admirable examples, not only in the villas, but in the public squares of many towns Among them may be mentioned the beautiful Farnese fountain in the Lante Villa, near Viterbo, the elaborate fountain in the Piazza Pretoria at Palermo (1550), by Florentine artists, the late and highly rococo Fontana Medina at Naples the Neptune Fountain, by Gian Bologna, at Bologna; the Neptune Fountain, by Ammanati, at Florence, the fountain in the Piazza Madonna at Loreto, others at Fano, Viterbo (Piazza della Rocca), the Boboli Gar-

dens at Florence, etc At Rome most of the fountains of this type are of late date—e g, that about the obelisk of the Quirinal, the great basin fountain of the Villa Albani, the Tortoise Fountain in the Piazza Mattei, that in the Piazza Navona, etc At Rome also are three examples of another type, in which a structure like a triumphal arch pours forth one or more cataracts into a large basin, with or without sculpture, the Acqua Felice in the Piazza dei Termini (sixteenth century), the Fontana Paolina (1612), and the Fontana Trevi, the most spectacular of its type and grandly composed, even if in doubtful taste (N Salvi, 1762) This type, treated as a wall fountain, is the prototype of several fine fountains in Paris, of which the modern Fontaine Saint Michel, by Davioud, is the most ornate

Among the earliest Renaissance fountains in France is that of Clermont-Ferrand, an elaborate and beautiful architectural design forming a species of lofty canopy in the centre of a large basin (early sixteenth century) Jean Goujon carved the sculptures for the Fontaine des Innocents, designed by Lescot, in Paris (1550, reerected in recent times on an altered plan), whose nymphs are famous He also made the Diana for the fountain at the Château d'Anet The magnificent basins, jets, and other water works at Versailles belong to a later date The French have developed the cascade type into a greater variety of forms than is found in Italy and have handled these with great taste, not only in such "châteaux-d'eau" as that of Saint-Cloud, but in many recent examples in which sculpture plays an important part (Fontaine Sainte-Marie, at Rouen, Fontaine Longchamps, at Marseilles) The central shafted type has also been developed by modern French artists in a number of beautiful examples, such as the twin fountains by Hitorff in the Place de la Concorde, at Paris, the Louvois Fountain, by Visconti (1835), and the Fontaine des Saisons, by Carpeaux, in the Observatory Gardens, in the same city. The Fontaine Saint-Sulpice, by Visconti, is a cold but effective design The Birague, Grenelle (by Bouchardon), Molière, and Cuvier fountains, in Paris, should also be mentioned The fountains at Bern, Switzerland, and the Alameda Fountain at Malaga, Spain, are good examples of the simpler type, with statues on central shafts There are a number of interesting fountains in Belgium, while at Vienna the Neuer Marktbrunnen (1739), the Hochstrahlbrunnen in the Schwarzenberg Palace gardens, and the Albert Fountain, deserve at least passing mention The highest artificial jet fountain is that of the palace of Herrenhausen, Hanover, which is over 200 feet high But no other European country can compare with France and Italy in the number and beauty of its fountains, considered as works of art

In the Orient the Greek tradition of covered fountains was continued by the Mohammedan artists, though the Moors in Spain often adopted open basins, as in the Fountain of the Lions in the Alhambra Each city in the East was provided with many fountains, inclosed and usually covered in like the tombs, with one or more domes, and a fountain for ablutions has always been an essential requirement in every mosque court The Koran extols the erection of a public drinking fountain as a specially meritorious form of charity Cairo, Constantinople, Adrianople, and Damascus are especially rich in them, there being 300 in Cairo alone They are circular, polygonal, or rectangular, and ornamented with brilliant tiles, niches, columns, carving, inlay, and gilding, but have no display of water even within, for it falls into very small basins from a concealed central supply. The finest of the Turkish fountains is the large and highly ornate Fountain of Achmet III, near the Mosque of St Sophia, another almost equally important is in Scutari, a suburb of Constantinople

Artificial fountains are not abundant in American cities, yet there are some in the parks and squares of Cincinnati (the Probasco Fountain), New York (Central Park, City Hall Park, Bronx Park, etc), and other places that are occasionally in action The earliest decorative fountain in the United States appears to have been set up in Philadelphia about 1829, with a wooden figure carved by a ship carver, but of real artistic merit Decorative fountains have played an important part in the design of recent exhibitions in the United States, notably the Fountain of the Republic, by Macmonnies, at Chicago in 1893, and the fountains of Man, Nature, Progress, etc, in the Pan-American Exposition grounds at Buffalo in 1901, the fine cascade fountain of the Louisiana Purchase Exposition (St Louis, 1904), etc Following Italian precedents, American landscape artists and owners of fine estates are to an increasing degree using fountains as garden decorations, and women sculptors have been especially successful in this branch of art Within recent years both memorial fountains and drinking fountains have been put up more liberally in the United States, especially by private individuals, and are often artistically designed and decorated.

Consult Boussard, *Choix de fontaines decoratives* (Paris, 1883), Duval-Moisy, *Les fontaines de Paris, anciennes et nouvelles* (ib, 1828), Falda, *Le Fontane di Roma e luoghi pubblici della città* (Rome, 1691), "Minor Fountains," in *American Architect* (Boston, 1898?)

FOUNTAIN OF AR'ETHU'SA See ALPHEUS

FOUNTAIN OF CASTA'LIA See CASTALIA

FOUNTAIN OF VAUCLUSE, vō'klüz' See VAUCLUSE

FOUNTAIN OF YOUTH A miraculous fountain having the property of restoring youth and healing sickness Such fountains are a part of the mythology of many lands In the Middle Ages a fountain of youth was supposed to exist in an island or region called Bimini and was sought by Ponce de León, De Soto, and other Spanish explorers

FOUNTAIN PEN See PEN

FOUNTAINS ABBEY An extensive Cistercian monastery, 3 miles from Ripon, England, dating from the thirteenth century and standing on the demesne of Studley Royal, the property of the Marquis of Ripon The picturesque ruins represent only a portion of the abbey The Norman-English church is in good preservation, and the remains of the refectory, chapter house, and great cloister are still extant Consult Hodges, *Fountains Abbey* (New York, 1904), and Oxford, *The Ruins of Fountains Abbey* (London, 1910)

FOUQUÉ, fōō'kā', FERDINAND ANDRE (1828–1904) A French geologist, born at Mortain and educated at the Normal School at Paris, where from 1853 to 1858 he was curator of the scientific museum. After holding positions in

several educational institutions and taking part in a large number of scientific expeditions, he became known particularly for his investigations of volcanoes, and in 1877 was made professor of geology in the Collège de France His researches into the constitution and origin of the igneous rocks and into the optical properties of minerals helped to establish the modern science of petrology upon a firm basis In these investigations he frequently cooperated with Michel Lévy He was elected to the Academy of Sciences in 1881 He published a large number of scientific works, among the most important of which are *Introduction à l'étude des roches éruptives françaises* (1879), *Santorin et ses éruptions* (1879), *Synthese des minéraux et des roches* (1882)

FOUQUÉ, Friedrich Heinrich Karl, Baron de la Motte See La Motte Fouqué

FOUQUET, foo'kā', or **FOUCQUET,** Jehan (c 1420–c 80) A French portrait and miniature painter and illuminator, the most representative of the fifteenth century He was born in Tours, and studied there and probably in Paris and Italy His art, while thoroughly individual and national, was undoubtedly formed under the influence of the Flemish school of the Van Eycks and under that of the early Florentine masters, especially Fra Angelico, assimilating the finest qualities of both In his miniatures he probably followed Pol de Limbourg He was in Italy about 1443–47 and painted the portrait of Pope Eugenius IV, long preserved in Santa Maria Sopra Minerva, Rome, but now lost On his return to France he was appointed court painter to Charles VII and later to Louis XI and became the head of a flourishing school Fouquet was appreciated only as a miniature painter until recent historians recognized his value, artistically and historically, as the founder of the French school, and the exhibition of the French Primitives at Paris in 1904 revealed his excellence as a painter His only authentic paintings are the portraits of Charles VII and Juvenal des Ursins in the Louvre, to which the latest critics are inclined to add the portrait of a "Man with a Glass of Wine," also in the Louvre, a portrait of a man, in the Liechtenstein Gallery, and one in the collection of Count Wilczek in Vienna, two wings of a diptych—one representing Agnes Sorrel as the Virgin, in the Antwerp Museum, and the other a kneeling figure of Etienne Chevalier, in the Berlin Museum His most celebrated illuminations are a series of miniatures for a French paraphrase of Boccaccio (1458), in the Munich Library, the *Book of Hours* of Etienne Chevalier, 40 pages of which were bought by the Duc d'Aumale for the Chantilly collection, for 300,000 francs, two volumes of illustrations for Josephus' *History of the Jews* (National Library, Paris), perhaps his best work, and *Les grandes chroniques de France,* also in the Bibliothèque Nationale His drawing is vigorous, the expression of his faces lively, and his color clear and glowing, his realism restrained, and his observation keen, with a fine sense of humor Consult *Œuvres de Jehan Foucquet* (Paris, 1866–67), "Facsimiles of two Histories by Jean Foucquet," from vols i and ii of *Anciennetés des Juifs* (London, 1902), Lafenestre, *Jehan Fouquet* (Paris, 1905), Richter, *Chantilly in History and Art* (London, 1913).

FOUQUET, Nicolas, Vicomte de Melun and de Vaux, Marquis de Belle-Ile (1615–80) Superintendent of Finance under Louis XIV He was born in Paris, Jan 27, 1615, the son of a French nobleman high in the confidence of Richelieu Young Fouquet was educated for the civil service and from 1642 to 1647 was attached as intendant to the Army of the North He was then made Commissioner of Police, Justice, and Finance in Dauphiné and held other important offices until, in 1648, he was called to Paris as intendant for the municipality and became involved in the political intrigues of the day In 1650, through the influence of Mazarin, Fouquet was given the important post of Procureur-Général to the Parlement of Paris His attitude during the Fronde (q v) had won him the regard of the court, and of Anne of Austria in particular, and in 1653 he was made Superintendent of Finance with a colleague, Servien, for his faithfulness to Mazarin His colleague died in 1659, leaving Fouquet alone in office As chief Financial Minister, Fouquet set himself to work to reorganize the finances of France Corruption and maladministration, together with heavy war expenses, had drained the treasury, and it is stated that the new Minister had at first to meet expenses by negotiating loans on his own credit Mazarin soon became jealous of his protégé's influence, and after the Peace of the Pyrenees (1659) and the marriage of the King, an open breach took place in their relations, and henceforth each sought to overthrow the other In his anxiety to be supreme, Fouquet overdid his part, and on the death of Mazarin, Colbert (q v) was consulted regarding the state of the finances and secretly influenced the King against Fouquet by putting the financial situation in the worst possible light Meanwhile Fouquet had secured possession of the port of Belle-Ile and had fortified it as a place of refuge He also erected a magnificent château on his estate at Vaux, and there, in August, 1661, he entertained the King with a magnificence and splendor hardly surpassed later at Versailles Louis XIV would not be conciliated, however, and Fouquet would have been arrested in the midst of the festivities, but for the prayers and intercession of the Queen-mother, Anne of Austria, who was still his friend There can be little doubt that the charges of maladministration and dishonesty brought by Colbert against Fouquet were substantially true, for the latter was forced to resort to peculation in order to keep up the almost royal state in which he lived In an age, however, when every one connected with the royal treasury stole, it was Fouquet's only misfortune to be caught He had been craftily persuaded to sell his office of Procureur-Général and so deprive himself of the privileges that went with the office He was arrested at Nantes, in September, 1661, charged with malfeasance in office and with planning rebellion His papers were seized and examined After being moved from prison to prison, he was consigned to the Bastille, and in 1664 was adjudged guilty, after a very unfair trial lasting over three years, and was condemned to perpetual banishment, with confiscation of goods and property This sentence the King changed to imprisonment for life, and Fouquet was sent to the fortress of Pignerol at the beginning of 1665 During his 15 years' captivity he composed several works of a devotional nature He died at Pignerol, March 23, 1680 During the height of his power Fouquet was a generous patron of art and literature

and was intimate with all the literary men of the day He presented to the Bibliothèque Royale (now Nationale) 13,000 rare volumes which he had collected He had, however, neither the breadth nor the statesmanship of his contemporary, Colbert Consult Holland, *Œuvres de M Fouquet* (Paris, 1696), Cheruel, *Mémoires sur la vie publique et privée de Fouquet* (ib, 1862), Lair, *Nicolas Fouquet* (ib, 1890), Hassall, *Louis XIV and the Zenith of the French Monarchy*, in the "Heroes of the Nations Series" (London, 1885), Chatelain, *Le surintendant Nicolas Fouquet* (Paris, 1905)

FOUQUIER, fōō'kyā', JACQUES FRANÇOIS HENRY (1838–1901) A French publicist, born in Marseilles He studied law and medicine, pursued a course in art at the Institute in Geneva in 1861 entered journalism in Paris, and in 1867 was a war correspondent with Garibaldi in Italy He held various administrative positions in the Department of the Interior and after being defeated in 1885 and 1888 was elected, in 1889, a member of the National Assembly He was connected editorially with *La Vraie République*, *Le Petit Parisien*, and *Gil Blas*, and in 1891 became the dramatic critic of *Le Figaro* His publications include *Etudes artistiques* (1859), *L'Art officiel et la liberté* (1861), *Au siècle dernier* (1884), *La sagesse parisienne* (1885), and a play (1890) with Fabrice Carré, adapted from Ranc's *Le roman d'une conspiration*

FOUQUIÈRES, fōō'kyâr', (LOUIS) BECQ DE (1831–1887) A Frenchman of letters who began life as a soldier and became an officer, but resigned from the army in 1858 to devote himself to literature He is best known as the incomparable editor of André Chenier's works, and is remembered also for his editions of the selected poems of Baïf and of the works of François de Pange. From him came also. *Drames et Poésies* (1860), *Jeux des anciens, leur description, leur origine, leurs rapports avec la religion, l'histoire, et les arts et les mœurs* (1869), *Aspasie de Milet* (1872), *Documents nouveaux sur André Chénier et examen critique de la nouvelle édition de ses œuvres, accompagnés d'appendices* (1875), *Œuvres choisis des poètes du XVIe siecle* (1879), *Traité general de versification française* (1879), *Lettres critiques sur la vie, les œuvres, et les manuscrits d'André Chénier* (1881), *Traité de diction et de lecture a haute voix* (1881), *Traité élémentaire de la prosodie française* (1881); *L'Art de la mise en scene* (1884)

FOUQUIER-TINVILLE, tăn'vēl', ANTOINE QUENTIN (1746–95) The public accuser of the Revolutionary Tribunal during the Reign of Terror. He was born at Hérouel, in the Department of Aisne, practiced law there for some time, then came to Paris and turned police spy On the outbreak of the Revolution he figured as one of the fiercest of democrats By Robespierre he was appointed, first a member, then director and public accuser, of the Revolutionary Tribunal (March 10, 1793) He performed the duties of his office with a bloodthirsty relentlessness that came partly from lack of feeling, partly from a brutalized conception of duty Regarding himself as the servant of the Revolution—though he was in reality only the tool of the Committee of Public Safety—he denounced impartially men of all parties and brought to the guillotine with equal fervor Bailly and Vergniaud, Danton and Hébert, Robespierre and Saint-Just After the passing of the Reign of Terror he was arrested and in May, 1795, guillotined, after a trial lasting 41 days Consult Lenotre, "Madame Fouquier-Tinville" in his *Paris revolutionnaire* (Paris, 1904), and Dunoyer, *Fouquier-Tinville, accusateur public du Tribunal révolutionnaire* (ib, 1913)

FOURBERIES DE SCAPIN, fōōr'be-re' de skā'păn', LES A comedy by Molière (1671), based partly on the *Phormio* of Terence There is an English translation by Otway (1677), under the title *The Cheats of Scapin*

FOUR CANTONS, LAKE OF THE See LUCERNE, LAKE OF

FOURCHAMBAULT, fōōr'shan'bō' A manufacturing town in the Department of Nièvre, France, 5 miles by rail from Nevers, near the right bank of the Loire It contains one of the most important iron foundries in France, which produces railroad supplies and art metal work in great quantities Pop, 1901, 6152, 1911, 4882

FOURCROY, fōōr'krwa', ANTOINE FRANÇOIS, COUNT DE (1755–1809) A French chemist He was born in Paris, the son of a druggist He became a student of medicine, and in 1780 received the degree of doctor of medicine About this time he delivered a course of popular lectures on chemistry and natural history which gained for him a high reputation Buffon, in 1784, secured his appointment as professor of chemistry at the Jardin du Roi, now Jardin des Plantes, which position he held for 25 years Fourcroy was one of the early converts to the theories of Lavoisier, together with whom and with Berthollet and Guyton de Morveau he prepared the *Méthode de nomenclature chimique* (Paris, 1787) In 1792 he was appointed a deputy to the National Convention, in 1794 he was made a member of the Committee of Public Safety, and in 1795 of the Council of Ancients During the time of his service he endeavored to improve the system of public education and was especially active in measures for the reform of the national system of weights and measures which led to the metric system He organized the Ecole Polytechnique and instituted schools of medicine Under Napoleon he became Director General of Public Instruction in 1801 He was the author of *La philosophie chimique* (1792) and *Système des connaissances chimiques* (11 vols, 1801)

FOUREAU, fōō'rō', FERNAND (1850–1914) A French African explorer, born at Saint-Barbant (Haute-Vienne) In 1876 he began the exploration of southern Algeria and in 1883 first went into the Sahara In 1898–1900 with Lamy he went from Biskra in Algeria to Lake Chad by way of Wargla, Agades, and Sinder, thence by the Shari River to the Congo, where two French forces joined In 1906 he became Governor of the Comoro Islands He published a map of the northern Sahara (1888), *Mission chez les Touareg, 1894–95* (1895), *Au Sahara* (1897), *Mission saharienne Foureau-Lamy d'Alger au Congo par le Tchad* (1902), *Documents scientifiques de la mission saharienne* (1903–05)

FOUR-EYED FISH See ANABLEPS

FOURIER, fōō'ryā, FRANÇOIS CHARLES MARIE (1772–1837) A French Socialist He was born at Besançon, April 7, 1772, the son of a merchant, and educated in the college there At the age of 18 he entered a cloth business, although from his childhood he had shown an

antipathy towards commerce on account of the deception and injustice he saw in it He visited all the large cities, not only in France, but in Holland and Germany, as a mercantile agent, thus gaining an opportunity for careful observation of social conditions At his father's death he inherited 80,000 francs and invested it at Lyons in colonial products During the siege of Lyons, in 1793, all his property was destroyed, his bales of cotton were used as breastworks, his provisions were taken to feed the soldiers, and he was himself thrown into prison In 1794 he was drafted into the army and served for two years in a cavalry regiment, from which he was discharged on account of ill health In 1799, as agent for a great provision merchant, he had to destroy a large quantity of rice which had been held for higher prices so long that it had become unfit for consumption The destruction of food needed by the poor made a lasting impression on his mind His business enterprises did not prosper, and for the greater part of his life he was in straitened circumstances His chief works were the *Théorie des quatre mouvements et des destinées générales*, published in 1808, the *Traité d'association domestique agricole* (1822), which contains his whole system and was later republished under the title *Théorie de l'unité universelle*, and *Le nouveau monde industriel ou invention du procédé d'industrie attrayante et naturelle, distribuée en séries passionées* (1829). Before his death he had a few followers, the most important one of whom was M Just Muiron, who was converted to Fourierism in 1814, but following his death his party gained many adherents Consult his *Œuvres choisies* (1890), which contains a biographical sketch by Charles Gide See FOURIERISM and the references given there

FOURIER, JEAN BAPTISTE JOSEPH, BARON (1768–1830) A French geometer and physicist, born at Auxerre He was the son of a poor tailor and was left an orphan at the age of eight The Bishop of Auxerre, recognizing his ability, placed him in a Church military school, where he soon showed a decided aptitude for mathematics At the age of 19 he wrote his memoir, *Sur la résolution des équations numériques de degré quelconque*, which was presented to the Academy in 1789 He took part in the Revolution, but in 1795 was sent as a student to the newly founded Ecole Normale, and soon after obtained the chair of analysis in the Ecole Polytechnique (1795–98) He went to Egypt in 1798 and was made perpetual secretary of the Institute of Cairo, and in the following year was placed at the head of one of the two scientific expeditions to the upper Nile He returned to France in 1801 and was made (1802) Prefect of Isère, a position which he filled with his usual tact and energy Napoleon created him a baron in 1808, but as, in 1814, he gave brief allegiance to the Bourbons, his political career was wrecked by the return of the Emperor from Elba He was, after much difficulty, made a member of the Academy of Sciences in 1815 and succeeded Delambre (1822) as perpetual secretary for the mathematical sciences He later became a member of the French Academy (1826) and succeeded Laplace (1827) as president of the council of the Ecole Polytechnique Fourier was one of the leading mathematical physicists of his time His labors were divided between the study of the theory of heat and of numerical equations Among his leading works are the following *Théorie analytique de la chaleur* (1822), *Analyse des équations déterminées* (posthumous, 1831), a memoir on statics (*Journal de l'Ecole Polytechnique*, 1797–98), and numerous memoirs on equations His works, including references to numerous biographical sketches, were published by Darboux under the title *Œuvres de Fourier* (Paris, 1889–90)

Fourier's series, communicated by Fourier to the Academy towards the end of 1807, plays an important part in mathematical physics Consult Du Bois-Reymond, *Zur Geschichte der trigonometrischen Reihen* (Tubingen, 1880)

FOURIERISM, fōō′rĭ-ĕr-ĭz′m This term is applied to the doctrines of Charles Fourier and to the communistic movement inspired by Fourier's teaching Fourier claimed to have discovered a mathematical basis for social organization The chief difference between the social system which he advocated and those of his contemporaries, Saint-Simon and Owen, is found in the retention, for a time at least, of private property and inheritance in Fourier's scheme Fourier believed that man is capable of becoming perfect His fundamental propositions were that the universe is governed by laws and that man, by means of reason, can discover these laws and can apply them to the organization of society When this shall be done, social harmony will reign and unhappiness will be unknown As yet, society is in its infancy The different systems which the human race have established in the past have been only experiments, but each one has been superior to the one which it replaced. This development will continue until perfection is reached The ideal, according to Fourier, has not been realized because our civilization is false—because the false sciences of ethics, economics, philosophy, and politics are followed instead of the true sciences —chemistry, physics, mathematics The social organization outlined by Fourier is based on the *passions* or desires of man There are 12 passions five sensitive—seeing, hearing, smelling, feeling, and tasting; four affective—amity, love, paternity, and ambition, and three distributive —cabalistic, alternating, and composite If all these passions are given free play, *passional attraction* causes the spontaneous formation of groups in society The unit of society must be large enough to allow all the passions to operate freely in all possible combinations, and should therefore consist of about 2000 persons Each group, or *phalanx*, should occupy a single building and provide itself with all the commodities and amusements desired The chief occupations are agriculture, manufactures, commerce, domestic economy, art, science, education, and government Within the phalanx the members are arranged in series and groups according to the law of passional attraction Special groups are organized for each branch of industry Individuals enroll themselves for those occupations for which they have natural aptitudes, and are allowed to change from one to another as often as they please Thus work yields only pleasure Fourier believed that association would economize expenditure and effort to such an extent that a man would need to work only 10 years of his life Under his system salaries are abolished; each person receives an ample minimum, and the surplus is distributed according to the amount of labor, capital, and skill contributed—five parts to labor,

four to capital, and three to talent There are no drones, since all the people are eager to confer benefits upon society Surplus products are exchanged between phalanxes Industrial armies are sent out to prepare new lands for occupation Government, so far as there is any, is republican, with annual election of officers Since there is no discord, there are no soldiers, policemen, or criminals At first Fourier expected society to become practically anarchistic, but later he found it necessary to map out a definite hierarchical scheme of government The unit, of course, is the phalanx, which is ruled by a *unarch* Three or four phalanxes form a union, three or four unions a district, a number of districts a province Nations, empires, caliphates, regions, continents, and finally a world unity are formed by similar combinations The rulers, in hierarchical succession above the unarch, are called duarchs, triarchs, and so on, up to the omniarch, who rules the whole world In addition to unity of government, there is unity of language, of weights and measures, of surveying. In fact, unity is one of Fourier's fundamental concepts He maintained that the law of gravitation governs not only matter, but the other three movements—social, animal, and organic—as well He found three indestructible principles—God, or spirit, the active and moving principle, matter, the passive principle, and justice or mathematics, the regulating principle to which reason corresponds Fourier claimed that the human race will remain on this earth until a cycle of 80,000 years has been completed The period of manhood is at hand The race will continue to develop for 35,000 years and then decline for 40,000 years

After the death of Fourier his party made a large number of converts in France and many communities were formed to test his system In every case where Fourier's suggestions were followed in detail the attempt failed M Jean Godin (q v.) founded at Guise a community where labor and capital are associated much after the plan of Fourier, but with many objectionable features left out. The establishment consists of iron, copper, sugar, and chicory factories and has been very prosperous. In the United States Fourierism was introduced in 1842 by Albert Brisbane and spread like an epidemic No less than 34 associations were formed in all parts of the North and West, but few held out for more than four or five years. The most notable of all was Brook Farm (q.v). See COMMUNISM, SOCIALISM

Consult Charles Pallarin, *Charles Fourier, sa vie et sa théorie* (Paris, 1843); E Sambuc, *Le socialisme de Fourier* (ib, 1899), Richard T Ely, *French and German Socialism* (New York, 1883), E Fournière, *Les théories socialistes au XIXe siècle* (Paris, 1904), Bourguin, *Fourier contribution a l'étude du socialism français* (ib, 1905), d'Isambert, *Les idées socialistes en France* (ib., 1905), Gide and Rist, *Histoire des doctrines économiques* (ib., 1909). For a literary exposition of the ideals and plans of modern Fourierists, see Emile Zola's novel *Travail*

FOURIER SERIES In mathematics and mathematical physics, a series whose terms are made up of sines and cosines of multiples of a variable angle, the general form being $a_0 - a_1 \sin x + b_1 \cos x + a_2 \sin 2x + b_2 \cos 2x + a_3 \sin 3x \times b_3 \cos 3x$, where the a's and b's are constants. These series have the great advantage for purposes of physics that they can represent not only continuous functions with a continuous derivative, but also functions presenting a considerable range of discontinuities, e g, a broken line or a curve made up of pieces of different analytic curves even with sudden breaks in the value of the corresponding function Thus the series $\sin x + \sin 3x \times \sin 5x +$ has the sum $\pi/4$ if x lies between 0 and π, but the sum is $-\pi/4$ if x is between $-\pi$ and 0 For $x = 0$ the sum is 0 By methods of the integral calculcus the coefficients a and b can be so determined that the series shall represent any given function provided the latter has only a finite number of singularities in the region considered The series may be employed to express the ordinate of a point on a vibrating string, the temperature in a body exposed to heat, the altitude of the tides, the varying pressure of the atmosphere, etc Especially where the phenomena are periodic, the Fourier series is of great use, since it resolves them into their component periods Thus, if the coefficients a and b are found to diminish rapidly after the first few, the early terms of the series represent the phenomenon broken up into components of periods π, $\frac{1}{2}\pi$, $\frac{1}{3}\pi$, . ., and by writing kx for x the periods can be made to take any values π/k, $\frac{1}{2}\pi/k$,

The Fourier series were employed by Daniel Bernoulli, Euler, Lagrange, and other older mathematicians They receive their name from J B Fourier (q v), who gave the first elaborate account of them in his celebrated work, *Théorie analytique de la chaleur* (1835) The difficult mathematical questions as to the convergence of the series, etc. were investigated by Dirichlet, Riemann, and others Consult Weber-Riemann, *Die partiellen Differential-Gleichungen der mathematischen Physik* (4th ed, Leipzig, 1900), Bôcher, "Introduction to the Theory of Fourier's Series," in *Annals of Mathematics*, Ser 2, vol vii (Princeton, N J, 1906), Hobson, *On the Theory of Functions of a Real Variable and on the Theory of Fourier's Series* (New York, 1907), Van Vleck, "The influence of Fourier's Series upon the Development of Mathematics," in *Science*, vol xxix, No 995 (New York, Jan 23, 1914).

FOUR-IN-HAND DRIVING See COACHING, DRIVING

FOUR LAKES. The term used to designate four closely connected Wisconsin lakes, called respectively Mendota, Monona, Waubesa, and Kegonsa, whose outlet, the Yahara River, flows into Rock River, one of the upper affluents of the Mississippi They are navigable for steamboats and drain a beautiful country The waters are clear and cold Madison, the capital of the State, lies between Mendota and Monona, the two largest lakes The combined area of the four lakes is about 28 square miles

FOUR-LINED SNAKE See CHICKEN SNAKE

FOURMIES, fōōr'mē' A manufacturing town and railway junction, in the Department of Nord, France, 36 miles southeast of Valenciennes (Map France, N, K 2) It contains numerous cotton and woolen mills and other industrial establishments, and in the vicinity are large iron mines Pop, 1901, 14,083, 1911, 14,143

FOURNEL, fōōr'nĕl', FRANÇOIS VICTOR (1829–94) A French author, born at Cheppy, near Varennes, and educated at Verdun and Paris He went into journalism in Paris (1854) and

was attached to the editorial staffs of *Le Français, Moniteur Universel,* and *Gaulois* His publications include *Les Contemporains de Molière* (3 vols, 1863–76), *Curiosités théâtrales* (1859); *Esquisses et croquis parisiens* (1876), *Vacances d'un journaliste* (1876); *Voyages hors de ma chambre* (1878), *Aux pays du soleil* (1883), *L'ancêtre* (1881), *Figures d'hier et d'aujourd'hui* (1883), *De Malherbe à Bossuet* (1884), *Petites comédies rares et curieuses du XVIIeme siècle* (1884), *Les artistes français contemporains* (1885), *La confession d'un père* (1886), which was crowned by the Academy, *Maman capitaine* (1889), *Les hommes du 14 juillet* (1890)

FOURNET, foōr'nā', JOSEPH JEAN BAPTISTE XAVIER (1801–69) A French geologist and meteorologist, born at Strassburg and educated at the School of Mines in Paris He took part in several geological exploration expeditions, and in 1834 became professor of geology in the faculty at Lyons, which position he retained until his death He was an authority upon the geology of the Alps and of southeastern France, and his original investigations were of considerable note, especially his discovery in connection with the sulphurization of metals, which was named, in his honor, "Fournet's law" He was a prolific contributor to various scientific publications and annals Among his other publications were *Géologie lyonnaise* (1862) and *Du mineur, son rôle et son influence sur les progrès de la civilisation* (1862)

FOURNIER, foōr'nyā', (JEAN) ALFRED (1832–1914). A French physician, specialist in skin diseases He was born in Paris and was a pupil of Ricord He was interne in 1854, and in 1863 became physician at the Lourcine Hospital, where he began his studies and lectures on syphilis, on which he wrote extensively. He was clinical professor in this branch at the University of Paris from 1880 to 1905, and from 1884 to 1905 at the Hospital St Louis He became Commander of the Legion of Honor His publications include *Recherches sur la contagion du chancre* (1857), *Recherches sur l'incubation de la syphilis* (1865), *Syphilis et mariage* (1880), *Prophylaxie publique de la syphilis* (1887), *Traitement de la syphilis* (1893, Eng trans, 1906)

FOURNIER, AUGUST (1850–) An Austrian historian, born and educated in Vienna, where he served in the Ministry of the Interior and in 1875 was instructor in history at the university Appointed assistant professor in 1880, he was called to the University of Prague in 1883 and returned as full professor to Vienna in 1903 As a member of the Reichsrat (1891–1900) and of the Bohemian Diet (1892–1901), he belonged to the German Liberal party Of his writings, *Napoleon I, Eine Biographie* (1886–89), which was immediately translated into French (Eng trans by Corwin and Bissell, 1903, and a later trans by Adams, 1912), is the most noteworthy His other works include *Gentz und Cobenzl Geschichte der oesterreichischen Diplomatie, 1801–05* (1880), *Handel und Verkehr in Ungarn und Polen um die Mitte des 18. Jahrhunderts* (1887), *Der Kongress von Châtillon* (1900), *Historische Studien und Skizzen III* (1912), *Die Geheimpolizei an dem Wiener Kongress* (1913)

FOURNIER, PAUL [EUGÈNE LOUIS] (1853–) A French jurist, born at Calais He was educated at the Ecole des Chartes and became professor of Roman law at Grenoble He was an authority on canonical law He wrote *La question agraire en Irlande* (1882), several important articles on the "False Decretals", *Le Liber Tarraconensis,* "Etudes sur une collection canonique du XIme siècle," in *Mélanges Julien Havet* (1895), "Les collections canoniques attribuees a Yves de Chartres," in *Bibliotheque de l'Ecole des Chartes* (1896); "Joachim de Flore Ses doctrines, son influence," in *Revue des questions historiques* (1900)

FOURNIER, PIERRE SIMON (1712–68) A French type founder and author He was born in Paris and probably received his first instruction from his father, who was director of the foundry of Guillaume Le Bé, and from the painter Colson In 1736 he established his own foundry, the entire material for which he manufactured himself Especially celebrated were his ornamented letters He also contributed greatly to the improvement of musical type, which subject he discussed in a special work He further had the distinction of publishing the first *Manuel typographique* (1764–66), a work which became exceedingly popular, and remained so long after the death of its author Among his principal publications may be mentioned *De l'origine et des productions de l'imprimerie primitive en taille de bois* (1759) and *Traité historique et critique sur l'origine et les progrès des caractères de fonte pour l'impression de la musique* (1765)

FOURNIER, TÉLESPHORE (1824–96) A Canadian jurist, born in Saint-François, Quebec He was educated at Nicolet College and was called to the bar of Lower Canada in 1846 He was elected a Liberal member of the Dominion Parliament in 1870, and in 1873 took his seat as Minister of Internal Revenue in the Mackenzie cabinet He was transferred to the portfolio of Justice in the summer of 1874, and from May to October, 1875, was Postmaster-General While Minister of Justice he introduced and was largely instrumental in passing the Supreme Court Act, although the constitution of that court was planned chiefly by Edward Blake (q v). In 1875 Fournier procured the passage of an important insolvency act Appointed (1875) a puisne judge of the Supreme Court of Canada, he retained that position until his death.

FOURNIER L'HÉRITIER, lā'rē-tyā', CLAUDE (1745–1825). A French Revolutionist, born at Auzon He went to Haiti and engaged in the manufacture of rum, but his factory was burnt Upon returning to France, he was called, for his stay in the New World, *L'Américain* He was active in all the great revolutionary days of 1789–92, especially the risings of Oct 5–6, 1789, July 17, 1791, and June 20 and Aug 10, 1792, was accused of plotting the murder of the Orléans prisoners who were killed while under his charge (1792), but was not found guilty, and, in spite of Marat's joining his accusers, was equally fortunate when accused of inciting insurrection He was in the infernal-machine plot of the Rue Saint-Nicaise, was found guilty and deported, and did not return until 1809 In 1811 he was again a conspirator and was sent to the Château d'If, was set free by the First Restoration, and was accused of a plot against the Bourbons after their second return, but set free again in 1816 In his last years he

paraded his royalist sentiments in hopes of a pension, but died a poor man Consult Aulard's edition of his *Mémoires secrets* (Paris, 1890)

FOUR PRENTICES OF LONDON, THE. A chronicle play by Thomas Heywood, written about 1600 and printed in 1615 and 1632 It was attacked by Beaumont and Fletcher in *The Knight of the Burning Pestle*

FOUR P'S, THE The best known of the *Interludes* by John Heywood (c 1543) The Four P's are a Palmer, a Pardoner, a Potecary, and a Pedlar

FOUR SONS OF AYMON, THE See AYMON

FOURTH DIMENSION See GEOMETRY

FOURTH DISEASE DUKES' DISEASE A mild eruptive fever resembling measles, scarlet fever, and German measles It was first described by Dr Clement Dukes in 1900 Many observers doubt its existence as a separate entity and consider it either a double infection of scarlet fever and German measles or an atypical form of one of these diseases The incubation period is about the same as that of German measles (9 to 20 days), and the disease is ushered in by malaise, mild sore throat, and the appearance of the rash, which covers the body in a few hours

FOURTH PARTY, THE A name applied, about 1880, to an opposition group within the English Conservative party, under the leadership of Lord Randolph Churchill (q v)

FOURTH STATE OF MATTER See MATTER, *Theories of Matter*

FOURTOU, fōōr'tōō', (MARIE FRANÇOIS) OSCAR BAUDY DE (1836–97). A French politician He was born at Ribérac (Dordogne) and was educated at Poitiers After acting as mayor of his native town, he was elected a member of the National Assembly in 1871 He was a defender of Thiers and became Minister of Public Works (1872), Minister of Public Instruction (1873–74), and Minister of the Interior (1874 and 1877) He was identified with the Clerical Bonapartist party, and as Minister of the Interior conducted a vigorous and aggressive campaign against the Republicans, dismissing from office all prominent representatives of that party and persecuting the Republican press He supported MacMahon in his electoral campaign in 1877 and lost his seat in the Chamber of Deputies in that year He was reelected to the Lower House in 1879 and, after serving (1880–85) in the Senate, again in 1889 He wrote *Histoire de Louis XVI* (1840), *Mme Swetchine* (1859), *Mémoires d'un royaliste* (1888)

FOUSSA See FOSSA

FOVILLE, fō'vēl', ALFRED DE (1842–1913). A French political economist and statistician, son of a distinguished alienist, born in Paris and educated at the Polytechnique He served successively as auditor of the Council of State, chief of the Bureau of Statistics, and professor at the School of Political Science In 1877 he became editor of the official *Bulletin de statistique et de législation comparée* His publications include *Mémoire sur les variations des prix au XIXème siècle* (1872), *La transformation des moyens de transport et ses consequences économiques et sociales* (1880), *Atlas de statistique financière* (1881, 1889), *La richesse en France et à l'étranger* (1893); *L'industrie des transports dans le passé et dans le présent* (1893), *Les conditions de l'habitation en France* (1894–99); *La monnaie* (1907); and hundreds of articles in the *Economiste français* Consult the sketch by Faure in *Revue politique et parlementaire*, vol lxxviii (Paris, 1913), pp 381–430

FOWEY, foi A seaport town of Cornwall, England, at the mouth of the Fowey, on the south coast, 22 miles west of Plymouth (Map England, B 6) It is noted for its situation amid hill and cliff scenery, and is a favorite resort for artists It has a deep harbor, with a narrow entrance guarded by three forts In the thirteenth and fourteenth centuries it was one of the chief seaports of England and its "Gallants of Fowey" aided greatly in founding England's naval power Its principal industry is the pilchard fishery, and it has a considerable export trade in the chinastone and iron ore of neighboring quarries and mines Pop (parish), 1901, 2258, 1911, 2276

FOWKE, fouk, GERARD (born SMITH) (1855–) An American archæologist and ethnologist, born in Maysville, Ky For many years he was connected with the United States Bureau of Ethnology in investigations in the eastern United States and in the Ohio valley The results of his discoveries were published in the *Annual Reports* of the bureau In 1894 and 1896 he investigated the supposed Norse remains near Boston Afterward he was engaged in explorations on Vancouver Island and in 1898 explored the lower Amur River, Siberia After three years of investigation of glacial deposits and channels of the Ohio valley he took up work for the Missouri Historical Society at St Louis in 1911 He wrote *Archeological History of Ohio* (1902) and *Montezuma Mounds* (1905)

FOWL (AS *fugol*, OHG. *fogal*, Ger. *Vogel*, Goth *fugls*, bird, fowl). A word commonly used now in a restricted application to useful birds, chiefly of the gallinaceous order Thus, "wild fowl" and "waterfowl" mean those birds of land and water respectively in which sportsmen are interested, and "barnyard fowl" are the domesticated kinds—poultry When used in the singular, however, the word almost invariably signifies a full-grown domestic chicken

Domestic Chickens Chickens are raised in the United States for their flesh, for the production of eggs, and as fancy stock for exhibition purposes According to Howard there are 87 standard and a large number of promiscuous varieties of chickens raised in the United States, which have been divided into 10 classes For practical purposes the 10 classes may be grouped into four general classes as follows (1) general-purpose breeds, the American class, (2) meat or table breeds, the Asiatic class, (3) egg-making breeds, the Mediterranean class, (4) ornamental breeds, the Polish, exhibition games, miscellaneous, and bantam classes

The *Plymouth Rock* is the most popular of all breeds of chickens for general purposes It is of medium size, hardy growth, and good egg-laying qualities The barred variety is the most generally known It is of a grayish-white color, regularly crossed with parallel bars of blue-black running in straight distinct lines throughout the entire length of the feathers The standard weight of the cocks is nine and one-half pounds, and of hens, seven and one-half pounds Other varieties of Plymouth Rock are very like the barred except in color The *Wyandottes* (q v) are rated next to the Plymouth Rocks as general-purpose fowls The *Light Brahma*, which became popular between 1850 and 1860, is the

leading variety of the Asiatic class The male is pure white in color excepting the hackle, tail, and flights, which are black, and white striped with black The shanks are well feathered, with the feathering extending down to the middle toe The Brahma female has a white head, hackle white, striped with black, cape white and black, completely covered by the hackle when the bird stands erect The average Light Brahma male is 26 inches in height The standard weight of the cock is 12 pounds, of the hen, nine and one-half pounds The *Cochins* are second only to the Brahmas for edible purposes, weighing somewhat less than the Light Brahmas There are several varieties of Cochins—buff, partridge, black, and white All have heavy leg and foot feathers The *Leghorns* are the best known of the egg-producing varieties of the Mediterranean class They mature early and feather quickly The pullets often begin laying when four months old There are a number of varieties of Leghorns which differ in color and in the form of comb, which in all cases is large and a distinguishing mark of the breed The Leghorn cock has a graceful, round, and plump body, broad at the shoulders and tapering towards the tail The Leghorn hen in many respects resembles the cock in shape and carriage, and is even more graceful The *Ornamental Breeds* vary greatly Bantams are characterized by their small size, the silky fowls by their soft webless feathers, which when in prime condition are less fluffy and stand out from the body in all directions, and the Yokohama fowls by the great length of the tail and hackle feathers, the tail feathers of the cock sometimes attaining a length of 6 feet or more The *Games* are commonly divided into two distinct varieties —exhibition and pit The exhibition game is long, lanky, close-feathered throughout and spare in tail feathering The pit is short, stout, and stocky, with abundant tail feathering, and for the farm and general purposes has always been considered a practical and profitable fowl It is hardy, matures early, is a good layer, and its flesh is considered of exceptional value for the table, being fine-grained, tender, and sweet The hens are splendid sitters and careful mothers See Plate accompanying POULTRY

Industrial Considerations Chicken raising, an important industry whether conducted as a special business or as a part of general farming, depends upon suitable houses and proper care and feeding It is very desirable that chickens be provided with a house somewhat separated from the other farm buildings, but near enough to the barnyard so that they can spend a part of their time in scratching for and gathering up the many seeds and grains that would otherwise not be utilized Poultry houses need not be elaborate in their fittings or expensive in their construction Material and construction will vary in different regions, but the houses should always be planned with regard to cleanliness and convenience They should be cool in summer and warm in winter, and, when it is not desirable to allow poultry free range, the houses should be provided with yards or runs, because chickens need exercise Coops for young chickens are of various styles, some being very simple and others provided with yards covered with netting to exclude hawks and cats The poultry house should be located upon soil which is well drained and dry A gravelly knoll is best, but, failing this, the site should be raised by the use of the plow or scraper until there is a gentle slope in all directions, sufficient to prevent any standing water even at the wettest times A few inches of sand or gravel on the surface will be very useful in preventing the formation of mud A group of evergreens or other windbreak will be a decided advantage in sheltering the house from the north and northwest winds in the colder parts of the country.

The amount of space to be allowed per chicken depends upon the size of the fowls, whether a shed is attached to the house, and whether the fowls have free run of the open fields For chickens in confinement there should be from 6 to 15 square feet for each adult bird in case there is no shed attached to the house, with a shed this space may be reduced about one-half The yards should be large enough to allow exercise in the open air and to furnish more grass than the birds will eat This will vary from 60 to 150 square feet per adult bird An open shed facing the south is of great assistance in maintaining the health and productiveness of the flock In it the birds can be induced to hunt for their food and take exercise in all seasons of the year, and they can enjoy scratching and dusting themselves in the sunshine, even during the winter months Chicken houses provided with earth floors are frequently damp and unsatisfactory and the cause of various poultry diseases Cement floors are cold and also more or less damp According to D A Salmon, who is authority for many of the statements given here, a good cement floor laid on broken stone and covered with a few inches of earth would probably be satisfactory, if not too expensive A board floor, 6 or 8 inches above the earth, with good ventilation under it, is dry but too cold, except in the South A double flooring, laid tightly with building paper between, or a good single flooring covered with a few inches of dry earth, is probably the best. In all cases of board floors there should be sufficient space beneath for ventilation and to guard against lodgment of rats Convenient roosts should be provided They should be nearly flat or rounded slightly on the upper surfaces Crevices in which vermin may hide should be avoided Such precautions suffice in most cases to keep the poultry free from chicken lice, the characteristics of which are given under LOUSE The roosting space allowed should be 6 to 8 inches for the small breeds, 8 to 10 inches for the medium, and 10 to 12 inches for the large breeds of chickens

Nests and Eggs. Suitable nests are an essential requirement for egg-laying stock The simplest form of nest is a box placed upon the floor of the poultry house With heavy fowls, which are apt to break their eggs in fighting away other hens that try to enter their nests when they are laying, and thus acquire a habit of egg eating, a more concealed or dark nest may be necessary Although on small farms, in towns, and in villages it is generally necessary to confine poultry in houses and yards, there are many large farms where poultry may be raised with the greatest economy by allowing them to range The large area at their disposal furnishes an exhaustless supply of insects and worms and an abundance of water, seeds, and grains which chickens alone can utilize Under such circumstances fowls take care of themselves so well and are so energetic in seeking their

food that they are either forgotten, and allowed to shift for themselves when they really need attention and assistance, or they are regarded as a nuisance because they sometimes do a little damage When fenced away from the garden and flower beds, fowls do little damage and cause scarcely any annoyance on a farm On the other hand, they do an immense amount of good in the protection of crops by the destruction of injurious insects, larvæ, and worms and are especially useful on fruit farms Eggs are hatched under the hens or in incubators Incubator chicks may be conveniently cared for in brooders or "artificial mothers" Many incubators and brooders have been devised which have been shown by experience to be satisfactory

Feeding Chickens require a mixed diet of grain, animal food, and green or succulent materials The food must also supply the lime and other mineral matters needed for eggshells, and an abundance of grit, required for digesting food, is also essential Pure water should at all times be provided A number of forms of drinking fountains have been provided to meet the latter requirements When only a small flock of hens is kept, chiefly to provide eggs for family use, a mistake is frequently made in feeding too much corn. It has been shown by experiments that corn should not form a very large portion of the grain ration of laying hens, as it is too fattening, especially for hens kept in close confinement Corn, no doubt because of its cheapness and abundance, has generally been considered in the United States to be the most valuable poultry food In recent years, more than formerly, wheat has been fed and the poultry ration thereby improved Wheat is preferable to corn, and oats are an excellent food, better, perhaps, than any other single grain, particularly if the hull has been removed. When comfortable quarters are provided, fowls kept for egg production should have a ration with a nutritive ratio of about 1 4 When poultry is fed for the production of flesh, the ration should contain more fat and carbohydrates in proportion to the protein, i e, it should have a wider nutritive ratio than the ration cited for egg production For forcing fowls for egg production, as in forcing animals for a large yield of milk, the ration should be made up of a number of kinds of grain Experiments have shown that fowls not only eat their food with better relish if it is composed of many kinds of grain, but that the proportion digested is larger than when made up of fewer constituents The food consumed has an effect upon the flavor of eggs, and in extreme cases upon the odor also Thus, onions when fed for a considerable time produce a noticeable flavor in eggs The majority of poultry raisers believe that ground food or soft food should form a part of the daily ration and that it is desirable to feed soft food in the morning, as it will be digested and assimilated quicker than will whole grain A mixture of equal parts by weight of corn meal and ground oats added to an equal quantity of wheat, bran, and fine middlings is recommended as a satisfactory food if mixed with milk or water It should be thoroughly wet without being sloppy The dry-grain ration should consist largely of whole wheat with some oats and perhaps a little cracked corn This should be scattered in the litter, which should always cover the floor of poultry houses, in order that the fowls be compelled to seek the corn, and thus obtain a considerable amount of exercise The litter also insures cleanliness Straw, chaff, buckwheat hulls, and cut cornstalks all make excellent litter At night, just before the fowls go to their perches, they should have all the corn they will eat up clean Some green food should be given to poultry, although perhaps it is not absolutely necessary Clover, rape, cabbage, etc, are recommended for the purpose Green food is especially desirable when chickens are kept in yards throughout the entire year

Fowls as Food The flesh of chickens is esteemed for its delicate flavor The young chickens are often spoken of as broilers For composition and food values of broilers and fowls, see tables under FOOD

Chickens are ordinarily broiled or fried, roasted or baked, boiled or stewed, and are seasoned and garnished in many different ways While delicate flavor and appetizing appearance contribute to the popular esteem in which poultry are held in all regions, there is an additional reason for their extended use in warm climates This is the fact that poultry may be kept alive and killed as they are needed for the table, thus when means of cold storage are absent, the loss from spoiling may be much more readily avoided than is the case with larger animals used for food It is commonly believed that the flesh of poultry is quite thoroughly and easily digested, and thus especially suited for the diet of invalids The value of eggs as food and their place in the diet are discussed under the title EGGS

The census of 1900 gave the number of chickens in the United States as 233,598,085 and the eggs produced as 1,591,311,171 dozens

Bibliography. A very large number of books have been published on the general subject of poultry, among which are the following Howard, "Standard Varieties of Chickens," in *United States Department of Agriculture, Farmers' Bulletin 51*, illustrated (Washington, 1900), McGraw, "The Plymouth Rock" and "The Wyandotte," in *United States Department of Agriculture, Bureau of Animal Industry, Bulletins 29* and *31* respectively (ib, 1901), Collingwood, *The Business Hen* (New York, 1904), Robinson, *Principles and Practice of Poultry Culture* (ib, 1912), Valentine, *The Beginner in Poultry* (ib, 1912), Weir, *The Poultry Book* (ib, 1912), Watson, *Farm Poultry* (ib, 1912), Lewis, *Productive Poultry Industry* (Philadelphia, 1913), Shaw, *Encyclopedia of the Poultry Yard* (New York, 1913)

FOWL CHOLERA. A virulent infectious disease of poultry common in Europe and America, which takes the form of a septicæmia and is due to a specific microorganism It was first studied in 1782 and was referred to anthrax Chickens are especially susceptible, but it occurs also in geese, ducks, pigeons, and even rabbits Three forms of the disease are recognized—the apoplectic, the acute, and the chronic In the first form the bird becomes suddenly dull, the wings droop, the eyelids fall and the feathers are elevated, the comb soon turns purple, the temperature rises to about 43° C, and death occurs within from two to five hours In the second form the same symptoms appear with the addition of acute diarrhœa, but the bird afflicted may suffer from 12 to 60 hours or perhaps recover after the diarrhœa has persisted for about two weeks In the chronic form a permanent or an intermittent diarrhœa is the

most marked symptom, and death from extreme emaciation and exhaustion is postponed for some weeks

The microorganism may gain entrance to healthy birds through the mucous membranes of the eye, respiratory and alimentary tracts The blood, all mucous and serous secretions, and excrementitious matter from affected birds are virulent, but when exposed to heat, fresh air, or direct sunlight, they become innocuous The virus may be destroyed by a one per cent solution of salicylic, benzoic, or carbolic acid Healthy birds may be immunized by inoculation with attenuated virus or with serum from immunized birds No medicinal treatment is of any avail in the apoplectic and acute forms In chronic cases dilute acids sometimes assist the birds to recover After an outbreak of this disease the poultry quarters should be cleaned and disinfected Healthy birds should not be allowed to run on the ground where diseased birds have been Consult Salmon, *Poultry Diseases* (Washington, 1902), Theobald, *Parasitic Diseases of Poultry* (London, 1896), Hutyra and Marek, *Special Pathology and Therapeutics of the Diseases of Domestic Animals*, vol i (New York, 1913), E W Hoare, *A System of Veterinary Medicine*, vol i (ib, 1913), J Law, *Text-Book of Veterinary Medicine*, vol iv (Ithaca, 1905–11)

FOW'LER, Charles Henry (1837–1908) An American Methodist Episcopal bishop, born in Burford (Ontario), Canada He graduated at Syracuse University in 1859 and at Garrett Biblical Institute in 1861, entered the ministry in 1861 and held various pastorates in Chicago, Ill From 1872 to 1876 he was president of Northwestern University, in 1876 he became editor of the *Christian Advocate*, of New York, and in 1880 missionary secretary In 1884 he was elected Bishop He visited South America in 1885 and organized there a very efficient missionary work Three years later (1888), on a tour around the world, he founded Peking University and Nanking University in central China and organized the first Methodist Episcopal church in St Petersburg, Russia He assisted in establishing Nebraska Wesleyan University (University Place, Neb) At the English Wesleyan General Conference of 1898 he proposed the Twentieth Century Thank Offering of $20,000,000, which was completed in 1902 He was the author of *Colenso's Fallacies* (1864), *Missions and World Movements* (1903), *Missionary Addresses* (1906), *Addresses on Notable Occasions* (1908), *Patriotic Orations* (1910)

FOWLER, Ellen Thorneycroft (c 1873–) An English novelist, eldest daughter of Lord Wolverhampton (Sir Henry Fowler), Secretary of State for India in 1894–95 Miss Fowler took as her residence Woodthorne, Wolverhampton, Staffordshire After publishing several volumes of mediocre verse and a volume of short stories (*Cupid's Garden*, 1897), she at once gained popularity by a clever society novel entitled *Concerning Isabel Carnaby* (1898) Many other books followed, among them *A Double Thread* (1899), *The Farringdons* (1900); *Fuel of Fire* (1902), *The Wisdom of Folly* (1910), *Her Ladyship's Conscience* (1913), *Place and Power* (1914)

FOWLER, Frank (1852–1910) An American figure and portrait painter He was born in Brooklyn, N Y, and studied painting for two years in Florence, Italy, under Edwin White and seven years in Paris under Carolus Duran and at the Ecole des Beaux-Arts He rendered valuable assistance to Duran on the fresco of Marie de Médicis in the Luxembourg On his return to New York, in 1879, he devoted himself for a time to mural painting, his most important work being the decoration of the ballroom of the Waldorf Hotel (1892) Later he painted chiefly portraits, including a number of public men, notably Governors Tilden and Flower, now in the State Capitol, Albany, Archbishop Corrigan, Charles A Dana, and others He wrote upon art topics for the magazines and several textbooks, including *Oil Painting* (1885) and *Portrait and Figure Painting* (1901) His technique is broad, with a fresh and delicate treatment, and he gives a faithful rendering of his subjects, with a poetic and imaginative conception At the St Louis Exposition (1904) he exhibited portraits of John Reid, W D Howells, and Allen P Fowler, in 1905, that of C W Larned, in 1907, "Isabel", in 1908, "The Yellow Scarf", and in 1910, the "Portrait of a Child" There was a memorial exhibition of his works at the Lotos Club, New York, in 1911, and an exhibition of the paintings and pastels left in his studio at the Anderson Galleries, New York, in 1912, including many landscape studies He was elected to the National Academy in 1899

FOWLER, Harold North (1859–) An American classical scholar, born at Westfield, Mass He graduated from Harvard University in 1880 and in 1883–85 studied at Berlin and at Bonn, where he gained his Ph D He was professor of Greek in the University of Texas (1892–93) and in the College for Women, Western Reserve University, after 1893, and was associate editor, and after 1906 editor in chief, of the *American Journal of Archæology* In 1912 he was elected president of the American Philological Association He edited Thucydides, book v (Boston, 1888), and Plautus's *Menæchmi* (ib, 1899), etc; wrote a *History of Ancient Greek Literature* (1902), *History of Roman Literature* (1903), *A Handbook of Greek Archæology* (with J R Wheeler, New York, 1909), and published (New York, 1914) the first two volumes of a translation of Plato, in the Loeb Classical Library

FOWLER, Henry Hartley, Viscount Wolverhampton (1830–1911) An English statesman, born at Durham He was a Liberal member of Parliament for the undivided Borough of Wolverhampton from 1880 to 1885 and thereafter represented the East Division At the close of the Gladstone administration of 1880 he was Undersecretary of State at the Home Office (1884–85) He became Financial Secretary to the Treasury and Privy Councilor in 1886, from 1892 to 1894 was President of the Local Government Board, and in 1894–95 was Secretary of State for India He was Chancellor of the Duchy of Lancaster in 1905–08 and was made Viscount in 1908 He retired from the cabinet in 1910 The son of a Wesleyan Methodist minister, he was prominent in that denomination and as a representative of nonconformists in politics

FOWLER, Sir John (1817–98) A British hydraulic and railway engineer He was born in Sheffield, England, and after engaging in various important works, in 1839 he became acting engineer in the construction of the Stockton and Hartlepool railways At the age of 27

he was selected as engineer for the construction of the large group of railways known as the Manchester, Sheffield, and Lincolnshire Having settled in London, he was continuously employed in the laying out and construction of railways and docks and in the improvement of rivers and reclamation of lands from the sea He designed and constructed the Metropolitan Underground Railway of London, with Sir Benjamin Baker designed and constructed the great Forth Bridge (1890), was for many years consulting engineer to the Egyptian government, and was made Baronet in 1890

FOWLER, THOMAS (1832–1904) An English educator and philosopher, president of Corpus Christi College, Oxford He was born at Burton-upon-Stather, Lincolnshire, and was educated at King William's College, Isle of Man, and at Merton College, Oxford, where he graduated in 1854 In 1855 he became a fellow and tutor of Lincoln College, Oxford He won the Denyer Theological Essay prize in 1858, was made select preacher in 1872, and was elected professor of logic in 1873 This chair he occupied until 1889, becoming meantime (1881) president of Corpus Christi College From 1899 to 1901 he was vice chancellor of the University of Oxford His publications include *The Elements of Deductive Logic* (1867, 10th ed, 1892), *The Elements of Inductive Logic* (1870, 6th ed, 1892), *Locke*, in "English Men of Letters" (1880), *Bacon's Novum Organum* (1889), *Locke's Conduct of the Understanding* (3d ed, 1890), *Francis Bacon* (1881) and *Shaftesbury and Hutcheson* (1882), in "English Philosophers Series', *History of Corpus Christi College* (1898), *Progressive Morality An Essay in Ethics* (1895), and, with J M Wilson, *Principles of Morals* (1885–87)

FOWLER, WILLIAM WARDE (1847–1921). An English classical scholar, born in Somerset. He was educated at Lincoln College, Oxford, of which he was scholar (1866), fellow (1872), and subrector (1881–1904) In 1909 he was Gifford lecturer at Edinburgh He wrote several books on birds *A Year with the Birds* (1886), *Tales of the Birds* (1888), *More Tales of the Birds* (1902) But his really important work was in classical history, especially religious and social, in such books as *Julius Cæsar and the Foundation of the Roman Imperial System* (1892), *The City-State of the Greeks and Romans* (1893), *Roman Festivals of the Republic* (1899), *Social Life at Rome in the Age of Cicero* (1908), *The Religious Experience of the Roman People* (1911), a short sketch of *Rome* (1912), *Roman Ideas of Deity in the Last Century before the Christian Era* (1914)

FOWLER'S SOLUTION. See ARSENIC

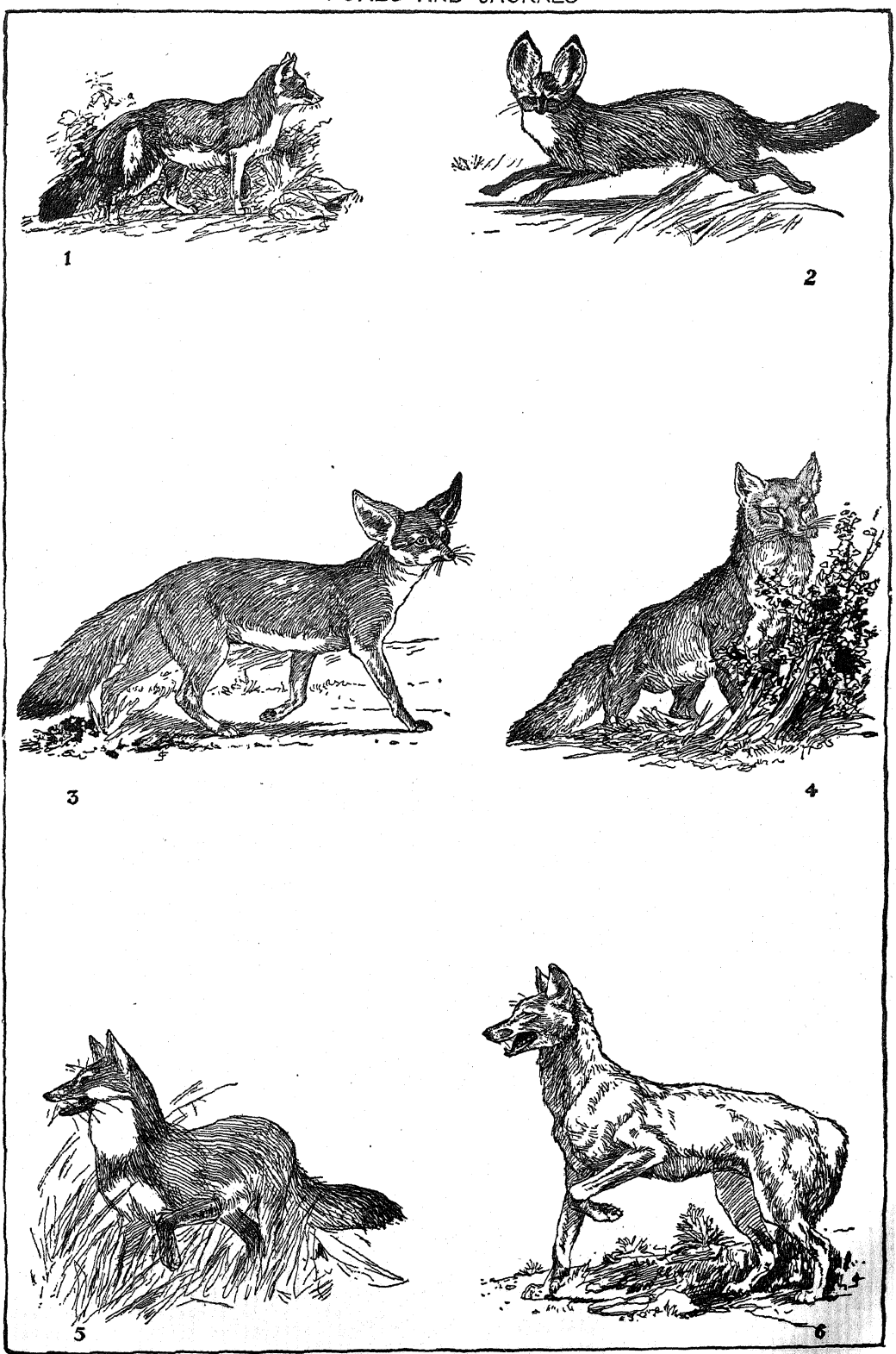
FOWLING See HUNTING

FOX (AS *fox*, OHG. *fuhs*, Ger *Fuchs*, fox, Goth *fauhō*, vixen, possibly connected ultimately with Skt *puccha*, tail). A member of a group or 'alopecoid series" of canine animals, more easily distinguished from the wolves, dogs, or jackals of the same family (Canidæ) by outward appearance than by zoological differences They are, in general, of smaller size and less proportionate height, have longer hair, usually more reddish or yellowish than gray, larger, more triangular and furry ears, a more slender pointed muzzle, with straighter jaws, and a longer and more bushy tail, than their allies. Some zoologists refuse to separate them even as a genus, but most students place them in the genus *Vulpes*, and still further separate the American gray fox as *Urocyon*, and the little African long-eared foxes as *Fennecus* The anatomical characters upon which Vulpes is distinctly based are principally found in the skull, where "the bony projection forming the hinder border of the socket of the eye is regularly curved downward and has a convex upper surface" in the wolves and jackals, "whereas in the fox the same process is hollow above and has a more or less marked tendency to curve upward behind", also, the air chambers in the frontal bones of the wolves are absent in the foxes Another constant distinction is found in the pupil of the eye, which, when contracted, is round in the doglike canines and elliptical in the foxes The true foxes (apart from the African fennecs) are scattered throughout all the northerly regions of the world, from the edge of the tropical zone to the highest Arctic lands, but none are known in the Southern Hemisphere The number of species is indeterminate, conservative naturalists regarding as local varieties various forms to which others give specific names

All inhabit holes in the earth, usually of their own digging, but do not hibernate, are nocturnal, and subsist mainly upon animal prey, which they capture by stealthy approach and a quick rush, and all utter yelping cries, and breed annually They are believed not to have contributed in any appreciable degree to the ancestry of any race of domesticated dogs, and although everywhere highly intelligent in their field of thought, are rarely tamed as pets or trained to perform tricks well The typical and best-known species is the European red fox (*Vulpes vulpes*, or *vulgaris*), the hero of British fox hunting (see FOX HUNTING), and the *renard*, or *Reinecke Fuchs* of European folklore (See Colored Plate of CANIDÆ) It is spread over the whole of Europe and Asia and is also found in Asia Minor and along the south shore of the Mediterranean The ordinary type, familiar in Great Britain and western Europe, is reddish brown above and white below, with the outer portions of the ears and feet black, and the tip of the "brush," or tail, white Its length may vary from 27 to 46 inches, exclusive of the tail, which is itself from 12 to 15 inches long Colors and markings vary greatly, however, as well as size and proportions The habits of the common fox in England are thus sketched by Lydekker and Bell, and the essential facts apply to the animal in all parts of its range

"Although the fox is by no means averse to taking possession of the deserted burrow of a rabbit or a badger, it generally excavates its own 'earth,' in which it spends a considerable portion of its time As all hunters know, foxes frequently prefer to live out in the woods, those with a northern aspect being, it is said, generally avoided Sometimes these animals will prefer a thick hedgerow or a dry ditch, while we have known them to select the tall tussocks of coarse grass in swampy meadows as a resting place, and they have also been found in straw ricks, where it is on record that in one instance cubs have been born. The breeding time is in April, and the usual number of young in a litter is from four to six The prey of the fox consists, writes Bell, 'of hares, rabbits, various kinds of ground birds, particularly partridges, of which it destroys great numbers, and it often makes its way into the farmyard, committing sad havoc

FOXES AND JACKALS



1. KIT FOX (Vulpes velox).
2. LALANDE'S FOX-DOG (Otocyon lalandii).
3. FENNEC (Canis zerda).
4. CORSAC (Canis corsac).
5. GRAY FOX (Urocyon argenteus).
6. JACKAL (Canis aureus).

among the poultry. It has been known not infrequently to carry off a young lamb When other food fails, the fox will, however, have recourse to rats and mice and even to frogs and worms, while on occasion beetles are largely consumed, and on the seashore fish, crabs, and mollusks form a part of its diet Carrion seems never to come amiss, while the old story of the fox and the grapes alludes to the fruit-eating propensities of these animals' The usual cry of the fox is a yelping bark The well-known scent of the fox is secreted by a gland situated beneath the tail The cunning exhibited by English foxes in escaping from hounds has been so often described that we shall make no further allusion to it here, beyond saying that it has probably attained its present development as the result of the inherited experience of many generations The life of the fox is a precarious one, the huntsman is his friend and the gamekeeper his foe, and were he not specially protected for the sport he gives to hounds and men, he would, like the wolf, have long since been extinct in England That the fox is an ancient inhabitant of the British Islands is proved by the occurrence of its fossilized remains in caverns in company with those of the mammoth and other extinct animals This, however, is not all, for a skull . has been dug up from the sands lying at the top of the Red Crag of Suffolk, which are vastly older than the mammoth period"

As the Old World fox is traced eastward, distinct local varieties are encountered, which, however, intergrade Thus, a black-bellied fox is characteristic of southern Europe and is decidedly different from the ordinary colors of the north African variety The dry plains of western Asia support a paler form, and this is succeeded eastward by two much larger types of the eastern and western Himalayas, which in winter, when the coat is long and the colors are heightened, are extremely handsome, a characteristic marking among these is a dark stripe athwart the shoulders Siberia, China, and Japan likewise have varieties of this same species, which, if the American red fox be also included, ranges throughout almost the entire Northern Hemisphere and has the most extensive distribution of all the Canidæ. Asia possesses some other very distinct species of foxes, nevertheless, of which the most familiar is the small, alert, and pretty India fox (*Vulpes bengalensis*), to be met with all over Hindustan, except in thickly forested regions It is rarely hunted by scent, with foxhounds, but frequently affords good sport by coursing with greyhounds Three other species of "desert" foxes, all pale and yellowish in hue, belong to the open sandy plains and tablelands between Arabia and Afghanistan One of these is the widely spread desert fox (*Vulpes leucopus*), another, the better-known corsac (q v), and the other varieties inhabit Tibet and Afghanistan The earliest fossil remains of distinctly canine beasts are foxlike animals of the Middle Tertiary period

American Foxes Several species of fox are characteristic of North America The most widespread and conspicuous is the Eastern red fox, called by American zoologists a distinct species (*Vulpes fulvus*) It differs constantly from the European fox, the colors being, on the average, rather brighter, and it varies on our continent quite as diversely as does the fox of the Old World The normal red fox remains common in spite of the civilization of the country throughout the eastern United States and Canada, westward to the Plains, as far south as northern Georgia, and reappears west of the Rocky Mountains and thence to the Pacific coast in a paler large-tailed form In the far north occur more rarely two other varieties—the cross fox and the silver fox The former is simply a more or less normal red fox, marked sometimes strongly, sometimes indefinitely, with a dark cross on the back and shoulders, fine specimens of which are given a superior value by traders in peltries The latter, or silver fox (var *argentata*), is much rarer, and is black, with a silvered or hoary appearance due to many of the hairs being tipped with white, the tail is black with a white tip, and the soles of the feet are hairy, fitting it for life amid ice and snow Good pelts of the silver fox are extremely valuable That both these are merely phases of the red fox is plain from the fact that they may be born in the same litter with normally red cubs Foxes totally black also occur frequently in the Hudson Bay region The American red fox had originally much the same habits as those of the European animal, seems to be deserving of quite as much credit for sagacity and acuteness, and has learned to accommodate itself as well to the exigencies brought by civilization and the chase The writings of American naturalists and sportsmen abound in interesting stories of its alertness, ingenuity, and adaptiveness, and show that it has spread and survived in the United States, where the gray fox has diminished

A small grayer species of the southern California coast (*Vulpes macrotis*) is conspicuously distinguished by its great ears

The kit, swift, or burrowing fox (*Vulpes velox*) is a well-marked species of the dry plains of the United States, whose range extends from Colorado and Nebraska north to the Saskatchewan valley. It is small, only about 20 inches long, slender and compact in form Its color is yellowish gray on the upper surfaces, fading through reddish to white on the belly and legs, and there is a black patch on each side of the muzzle The ears are short and densely furred, and the soles of the feet are overgrown with long woolly hair, like those of the Arctic fox It digs burrows with skill and speed, feeds upon small rodents, insects, small birds and their eggs, etc , and is remarkably swift of foot and dexterous in hiding Its fur becomes thick in winter and pale gray in color, rendering it nearly invisible See Plate of FOXES AND JACKALS

The blue or Arctic fox (*Vulpes lagopus*) is one of the most interesting of all the species It is known all around the Arctic shores, and in summer is a variable brown (even sooty in some cases) on the upper parts, and yellowish white on the ventral surfaces, throat, etc , the under fur, however, is everywhere dull blue. This bluish tint frequently appears in the summer dress in patches in the foxes of all regions, but in those of the Aleutian Islands and southeastern Alaska it characterizes the whole pelage and gives the name "blue" fox to the animal in that region E W Nelson, who describes it at length in his *Natural History of Alaska* (Washington, 1887), concludes that this is the typical, original form, from which the brownish and blackish foxes elsewhere are variants The blue foxes remain of that color all winter, putting on a longer, thicker coat as cold weather

approaches, but elsewhere all the Arctic foxes become purely white about October and remain so until spring They are animals of the open country and seacoast, and in winter they often visit the Eskimo villages or come close to their camps and are easily trapped "Parts of the country," says Nelson, speaking of Alaska, "where rocky ledges occur, are especially frequented by them, as the crevices among the rocks give them welcome shelter During summer they fare sumptuously upon the breeding waterfowl, eggs, and young birds, which are found everywhere, but in winter comes harder work, and the ground is carefully searched for stray mice, lemmings, or an occasional ptarmigan In early spring, towards the end of March, when the seals begin to haul up on the ice and the first young are born, thousands of these foxes go out seaward and live upon the ice the rest of the season The young seal's offal, left by hunters and from other sources, gives them more food there than the shore affords at this time" It may be added to this that Feilden, who was with the Polar expedition of Nares (*A Voyage to the Polar Sea*, London, 1878), found that in Grinnell Land these foxes subsisted in winter largely upon stores of frozen lemmings, etc, which they had hidden in crevices of rocks or had buried in the ground The fur of this fox is very valuable, and most of all that of blue foxes of the Aleutians, where they are now to a certain extent protected, especially where they have been colonized upon certain islands and are being bred and provided with food See ALASKA, FUR FARMING, and Colored Plate of CANIDÆ

The gray fox is a species (*Urocyon argenteus*) of the United States which is generally separated from other foxes by cranial peculiarities and by the fact that the tail has a concealed mane of stiff hairs The general coat is silver gray above and whitish on the underparts, but the chin and a patch on the nose are black, and the base of ears, patch at side of neck, collar on throat, interior surface of forelegs, and a broad band along the belly are cinnamon rufous The size is about the same as that of the red fox, but the hair is stiffer and less admirable as a pelt This species is generally distributed over the United States, but in the West differs locally so much from the Eastern type that five or more subspecies have been named It is accustomed to life in the forests rather than in open country and has unusual ability in tree climbing but it seems to be less adaptive than the red fox and has almost disappeared from the thickly settled and much-cleared Northern and Eastern States See Plate of FOXES AND JACKALS

Consult: for Old World foxes, Bell, *British Quadrupeds* (2d ed, London, 1874), Mivart, *Monograph of the Canidæ* (ib, 1890), Brehm, *Thierleben* (Leipzig, 1876; Eng trans by Pechnel-Loesche and Haacke, Chicago, 1894–96), Blanford, *Fauna of British India Mammalia* (London, 1889–91), Johnston, *British Mammals* (ib, 1903); Millais, *Mammals of Great Britain and Ireland* (ib., 1904–06), and general works For American foxes, Richardson, *Fauna Boreali Americana* (ib., 1829), Audubon and Bachman, *Quadrupeds of North America* (New York, 1851), Merriam, *Transactions of the Linnæan Society of New York*, vol 1 (ib, 1882), Burroughs, *Winter Sunshine* (ib., 1876), Cram, *Little Beasts of Field and Wood* (Boston, 1889); Seton, *Life Histories of Northern Animals* (New York, 1909), and general works upon Alaska and the Arctic coast

FOX, or **MUSKWAKI**, mŭs-kwa'kĭ An Algonquian people, best known as confederates of the Sauk (q v) They were called foxes (*Renards*) by the French, possibly because of having a Fox clan, but call themselves Muskwakiuk, 'red-earth people' When first known, they lived in central Wisconsin, having been driven from Lake Superior by the Ojibwa, whose continued inroads, together with a disastrous war with the French, finally compelled them to incorporate about 1760 with the Sauk, with whom they have ever since been so intimately connected that the two tribes are now practically one They constitute one of the central Algonquian tribes and belong to the woodland type of culture They lived in bark houses, raised some corn and vegetables, had a rather complex social organization, and are now extremely conservative in the adoption of civilized customs The Saukad Fox now number 724 Consult M A Owen, *Folk-lore of the Musquakie Indians of North America* (London, 1904), and *Handbook of American Indians* (Washington, 1907)

FOX, CAROLINE (1819–71) An English diarist, born at Falmouth, of a Quaker family that for two centuries had been prominently identified with Cornwall Her father, Robert Were Fox, the inventor of the deflector dipping needle, by his genial qualities drew around him many famous persons of his day, among them John Stuart Mill, John Sterling, and Thomas Carlyle Miss Fox has graphically sketched their characters and conversations in her posthumously published *Memories of Old Friends, Being Extracts from the Journals and Letters of Caroline Fox*, ed by H N Pym (London, 1882) Especially interesting are the accounts of the conversations between Mill and her brother, Barclay Fox

FOX, SIR CHARLES (1810–74) An English engineer He was born at Derby and, after serving as apprentice to Captain Ericsson, entered the service of Robert Stephenson He was subsequently a member of the firm of Fox, Henderson & Co, and after 1857 confined himself to private practice as consulting engineer Besides his extensive railway and bridge work in Great Britain, he built a bridge over the Saône at Lyons and constructed railroads in Denmark, France, Switzerland, Canada, South Africa, and India, where he introduced the narrow gauge The introduction of the switch in place of the sliding rail previously in use is also credited to him

FOX, CHARLES JAMES (1749–1806) A celebrated English statesman and orator He was the son of Henry Fox, first Lord Holland, and Lady Caroline Lennox, who was the eldest daughter of the Duke of Richmond and the great-granddaughter of Charles II He was born in Westminster, on Jan 24, 1749, was educated at Eton and at Hertford College, Oxford, and afterward traveled for two years on the Continent

On his return to England in 1768, although he was not yet of age, his father procured him a seat in Parliament by a purchase of the pocket borough of Midhurst His talent as a debater won him a place in Lord North's ministry, which he entered in 1770 as Junior Lord of the Admiralty In December, 1772, he was made Lord of the Treasury, but was dismissed

in February, 1774, because of his opposition to the King's favorite marriage bill and a useless humiliation inflicted upon Lord North The years that followed may be described as a conflict between the King, through his Minister, Lord North, and the brilliant Fox He was the most formidable opponent of the war with America, even foreseeing the necessity and advantages of a complete separation On the downfall of Lord North in 1782, notwithstanding the King's opposition, he was made Foreign Secretary in the Whig ministry of Rockingham He supported Pitt's motion for parliamentary reform and granted to Ireland complete legislative independence His masterful plan for the separation of French and American interests in the peace negotiations of Paris was circumvented by Shelburne, the Home Secretary As a consequence he resigned his office when Shelburne became Premier on the death of Rockingham Forming a coalition with Lord North and the Tories, he defeated Shelburne and resumed his old position as Foreign Secretary, but the personal influence of the King secured the rejection by the Lords of his India bill, which vested the government of India in a commission appointed by Parliament

What may be called the second period of the parliamentary career of Fox was occupied by his long struggle with Pitt He alone, of all the famous English statesmen of his day, favored the French Revolution and was opposed to the ruinous wars with France The total abolition of the slave trade, the removal of the political disabilities of both the Dissenters and the Catholics, were repeatedly urged by him He gave powerful aid in the impeachment of Warren Hastings, and in 1792 he secured the passage of his Libel Act, which as a measure for personal liberty is second only to the Habeas Corpus Act in importance When Pitt died (1806), Fox became Foreign Secretary in the Ministry of All the Talents, but he did not live to see either the slave trade abolished or his peace negotiations with France carried out He died in his fifty-eighth year, on Sept 13, 1806.

Fox was better qualified to lead an opposition than to govern an empire, for he lacked the tact and self-restraint necessary for managing parliamentary majorities and conciliating a headstrong King He was one of the most brilliant and interesting figures of the eighteenth century He had the vices of his day, but these were counterbalanced by his unfailing honesty and genial and kindly disposition His vices he owed in a large measure to his father, a notoriously corrupt politician who deliberately made of him a gamester He did not allow the faults of his private life to interfere with the strict performance of his parliamentary duties, and whenever he was in office he relinquished them altogether He was a man of fine literary taste, and among his friends were the poet Rogers, Gibbon the historian, and Dr Johnson Of his own literary efforts, the most important was a *History of the Reign of James II* (1808), left incomplete at the time of his death The work is of little value from either a scientific or a literary standpoint

Consult· Wright, *Speeches of the Rt Hon Charles J Fox in the House of Commons* (London, 1815), *Memorials and Correspondence of Charles James Fox*, ed by Lord John Russell (ib, 1853), being materials collected by Lord Holland, his favorite nephew, Lord John Russell, *The Life of C J Fox* (ib, 1859–66), Walpole, *Recollections of the Life of Fox* (ib, 1806), Trevelyan, *Early History of Charles James Fox* (New York, 1881), Wakeman, *Life of Charles James Fox* (London, 1890), in the "Statesman Series", Lecky, *History of England in the Eighteenth Century*, vols iii–vi (ib, 1882–87), Hammond, *Charles James Fox· A Political Study* (ib, 1903), Landor, *Charles James Fox A Commentary on his Life and Character* (New York, 1907), and *George III and Charles Fox* (ib, 1912)

FOX, Edward, Bishop of Hereford (c 1496–1538) An English ecclesiastic, born at Dursley, Gloucestershire, and educated at Eton and at King's College, Cambridge He became secretary to Wolsey, who sent him as an envoy to Rome (1528) for papal sanction to Henry VIII's first marriage Brought thus into royal notice, Fox was sent upon numerous diplomatic errands to France and elsewhere and rose rapidly till he became Bishop of Hereford (1535) He was the main mover in Henry's divorce of Catharine and marriage with Anne Boleyn and was active in securing the favorable opinion of the universities on this point He was a pillar of the Lutheran faith In 1535–36 he was in Germany on a political and theological mission The Ten Articles of 1536 were largely his work He is credited with the epigram, "The surest way to peace is a constant preparedness for war" His most important work is *De Vera Differentia Regiæ Potestatis et Ecclesiæ* (1534), of which an English translation was made in 1548 Consult Lloyd, *State Worthies* (London, 1679), and Brewer and Gairdner, *The Reign of Henry VIII* (2 vols, ib, 1884)

FOX, George (1624–91) The founder of the Society of Friends, or Quakers He was born at Fenny-Drayton, Leicestershire, July, 1624. His parents were in good circumstances, but it is doubtful if he had any schooling He was apprenticed to a shoemaker, but when about 19 came to believe himself the subject of a special divine call and took to wandering in solitude through the country, absorbed in religious reveries His friends induced him to return home; but he stayed only a short time, and finally adopted the career of an itinerant religious reformer About 1646 he left off attending church for worship In the same year he began preaching in Mansfield, Leicester, and other places, always under the feeling of a direct command of God He first attracted general attention in 1649, by rising in the principal church at Nottingham during the sermon and rebuking the preacher for declaring the authority of the Scriptures to be the source of divine truth "No," cried Fox, "it is not the Scriptures, it is the Spirit of God" This audacious act led to his immediate imprisonment On his release he repeated his protests elsewhere The excitement caused was very great, and Fox was frequently imprisoned as a disturber of the peace He gained followers, who first received the name "Quakers" in 1650 According to Fox's *Journal*, it was given by Justice Bennet, of Derby, because Fox had bidden the magistrates to "tremble at the word of the Lord" In 1655 he was examined in London before Cromwell, who pronounced his doctrines and character irreproachable Nevertheless he had a hard struggle, was constantly vilified, and frequently imprisoned by country magistrates. His followers increased in large numbers They

were naturally visionaries, mystics, and fanatics and their extravagances did much to bring the body and its founder into discredit It is no small item in Fox's favor that he, though himself subject to visions, succeeded in moderating their excesses and introducing discipline and organization among them He had much help from Margaret, widow of Judge Fell, of Swarthmoor Hall, Lancashire, whose house became the headquarters of the Quaker movement Although she was 10 years older than Fox, they were married in 1669 Fox traveled unremittingly, preaching his doctrines In 1671–72 he visited the West Indies and the continent of North America, and twice he went to Holland Of his many imprisonments the longest was at Lancaster and Scarborough, in 1663–66, and the last in Worcester jail, for nearly 14 months, in 1673–74 He died in London, Jan 13, 1691 Fox was not a man of broad and philosophic genius, and his writings are marked by a direct simplicity, void of the graces of style He won his success by earnestness and persistence, and the simplicity of his teachings, continually insisting upon a few leading doctrines, such as the futility of learning for the work of the ministry, the presence of Christ in the heart as the "inner light," the necessity of trying opinions and religions by the Holy Spirit, and not by the Scriptures, and the doctrine of "nonresistance" He was a man of winning personal manners and strong and sound moral nature He often showed great shrewdness in his dealings with magistrates His peculiarities of dress have been exaggerated and were adopted from a desire for simplicity rather than eccentricity The fullest collection of his writings is the Philadelphia edition (8 vols, 1831) The best known is his *Journal* (1634, new ed, 1902, abridged, London, 1903) Consult Tallack, *George Fox, the Friends, and the Early Baptists* (London, 1868), Bickley, *George Fox and the Early Quakers* (ib, 1884), Smith, *Descriptive Catalogue of Friends' Books* (ib, 1867), Beck, Wells, and Chalkley, *Biographical Catalogue* (ib, 1888) There are many biographies, among which those of Jenney (Philadelphia, 1853), Hodgkin (London, 1897), and Wood (ib, 1912) may be mentioned See FRIENDS

FOX, GEORGE L (1825–77) An American comedian, born in Boston He made his first appearance at the Tremont Street Theatre in that city at the age of five In New York, where he played for some time (after 1850) at the National Theatre in Chatham Street, he became popular as a low comedian. In the Civil War he was a lieutenant in the Eighth New York Infantry Inspired by the famous Ravel Brothers to undertake pantomime, he created a distinct place for that kind of entertainment in New York City, first at the National Theatre and later at the New Bowery, of which he was for a time lessee and manager His principal rôle was the clown in *Humpty Dumpty*, and no one has ever equaled him in this character He was scarcely less distinguished in his burlesques on famous tragedians of the day, especially Booth in the character of Hamlet Consult *George Fox: An Autobiography* (2 vols, Philadelphia, 1904)

FOX, GUSTAVUS VASA (1821–83) An American naval officer He was born in Saugus, Mass, entered the United States navy as a midshipman in 1838, participated in the war with Mexico, and retired with the rank of a lieutenant in 1856 He was in the wool-manufacturing business at Lawrence, Mass, from 1856 to 1861 Early in 1861 he was consulted by General Scott in regard to a relief expedition to Fort Sumter, but President Buchanan refused to allow the plan to be carried out After the inauguration of Lincoln, Fox was first sent to confer with Major Anderson and upon his return was commissioned to fit out a relief expedition at New York Fox, with part of his ships, arrived off Charleston harbor on the morning of the bombardment, but through an order which had detached the principal vessel of his fleet and sent it to Fort Pickens, he was unable to render aid After his return North, Fox served as Assistant Secretary of the Navy throughout the war He planned the opening of the Mississippi, the capture of New Orleans, and the selection of Farragut for high command In 1866 he was sent to Russia on a special congratulatory mission to the Czar, Alexander II, who had just escaped assassination, and he took part in the negotiations for the purchase of Alaska Upon his return to America he again entered the wool-manufacturing business at Lowell Consult Loubat, *Narrative of Fox's Mission to Russia in 1866* (New York, 1873)

FOX, HENRY, BARON HOLLAND (1705–74). See HOLLAND, HENRY FOX

FOX, HENRY EDWARD (1755–1811). An English soldier, the younger brother of Charles James Fox He studied at Westminster School and entered the King's Dragoons in 1770 Three years later he was made lieutenant of the Thirty-eighth, quartered in Boston He served at Concord, Bunker Hill, Long Island, White Plains, Brandywine, and Philadelphia, and in 1777 was made major and a year later lieutenant colonel of the Forty-ninth Regiment, and saw service in the West Indies In 1783 he returned to England and was made aid-de-camp by the King, who took a great fancy to him. Major general in 1793, he commanded a brigade at Roubaix and Mouveaux and at Pont-à-Chin (1794) beat back a French army In 1801 he was sent to Minorca and stayed there until 1803, when he went to Ireland as commander in chief and was badly frightened by the feeble rebellion under Emmet In the next year he was made Lieutenant Governor and actual commander of Gibraltar, and in 1806, on the accession of the Ministry of All the Talents, was appointed Ambassador to Naples and commander of the forces in Sicily, but he accomplished little there, quarreling with the Neapolitan court and being unwilling to risk all in an attempt to drive the French out immediately In 1807 he was recalled by the new ministry, after his brother's death, and subsequently was made general (1808) and Governor of Portsmouth (1811) He married Marianne Clayton (1786) and had two daughters and one son, Henry Stephen (1791–1846), who was Minister to the United States (1835) and did much to promote the success of the Ashburton Treaty

FOX, JOHN See FOXE, JOHN

FOX, JOHN (WILLIAM), JR (1863–1919). An American novelist He was born in Bourbon Co, Ky, in 1863, and graduated from Harvard in 1883 After some experience in journalism he traveled in Southern States and California and afterward engaged in business at Cumberland Gap, where he had ample opportunity for the study of mountain life He wrote *A Mountain Europa* (1894), *A Cumberland Vendetta*

(1895), *The Kentuckians* (1897), *Crittenden* (1900), a novel of the Cuban War, *The Little Shepherd of Kingdom Come* (1903), *Christmas Eve on Lonesome, and Other Stories* (1904), *Hell for Sartain, and Other Stories* (1897), *Blue Grass and the Rhododendron* (1901), *Following the Sun Flag* (1905), *The Knight of the Cumberland* (1906, 1913), *The Trail of the Lonesome Pine* (1908), *The Heart of the Hills* (1913)

FOX, LUKE (1586–1635) An English navigator He was born at Hull and went to sea at an early age On April 30, 1631 he sailed from London to search for a northwest passage The results of his explorations were subsequently embodied in the work entitled *Northwest Fox, or, Fox from the Northwest Passage* (1635, in Hakluyt Society Publications, with notes by Christy, 1894), which contained a most interesting map of the Arctic regions He made an extensive exploration of the western shore of what is now called Baffin Land, and discovered Cumberland Island and other points along Hudson Strait The far northern channel through which he passed was named after him

FOX, MARGARET (1836–93) An American spiritualist, born at Bath, Canada At Hydeville, Wayne Co, N Y, about 1848 (and afterward at Rochester), there were heard in the Fox residence rapping noises which appeared to proceed from the walls and furniture Margaret and her two sisters, Catharine and Leah, discovered that by means of a given code communication could be established with the presumably supernatural agency by which the raps were produced The sisters gave public séances in America and Europe, the chief features of which were the spirit rappings and the moving of large bodies by invisible means So-called "mediums" became numerous, and the investigation of spiritualistic phenomena interested many From the first, however, scientific minds discredited the claims of the sisters In 1888 Margaret made a confession of imposture, later retracted She claimed that she was the wife of Dr Elisha Kent Kane, who tried to persuade her to give up her séances, and whose correspondence with her she published in *The Love-Life of Dr Kane* (1866) See SPIRITUALISM

FOX, RICHARD See FOXE

FOX, THE See VOLPONE

FOX, SIR WILLIAM (1812–93) A New Zealand statesman He was born at Westoe, Durham, England, and graduated from Wadham College, Oxford, in 1832 In 1842 he went to New Zealand as agent of the New Zealand Company for the South Island, in 1850 he returned to London to present the claims of the colonists for self-government, but was unsuccessful at this time The purpose was ultimately accomplished, however, and Fox was a number of times Premier—for periods varying from 13 days to three years—in 1856, 1861, 1863, 1869–72, and 1873, in 1879 he had a seat in the New Zealand Parliament He brought about a lasting peace with the native tribes, the Maoris, and was active on behalf of temperance. His writings include *The Six Colonies of New Zealand* (1851), *The War in New Zealand* (1860), *How New Zealand Got its Constitution* (1890)

FOX, WILLIAM JOHNSON (1786–1864) An English Unitarian preacher, orator, and political writer The son of a peasant farmer, he was born at Uggeshall Farm, Wrentham, Suffolk, March 1, 1786. His father removed to Norwich, where he pursued various callings, and Fox, after primary education at a chapel school and working as an errand boy and weaver's help, became a banker's clerk He devoted his leisure to self-improvement in arts and languages and in 1806 was sent to Homerton Independent College for ministerial training Subsequently, in 1812, he seceded to Unitarianism, and in a London charge became celebrated as a rhetorician and the most eloquent exponent of English rationalism An unfortunate marriage and separation led to his resignation from the ministry, and he devoted himself to literature and public speaking In the interests of free trade and the Anti-Corn Law League he thrilled enthusiastic popular audiences with his oratory From 1847 to 1863 he represented Oldham in Parliament as an advanced Liberal His speeches in that critical assembly did not equal the success of his platform orations, but he soon acquired general respect by his tact and discretion His best parliamentary addresses were in favor of public education and the extension of the franchise, and he was the first to introduce into the House of Commons a bill for national secular education He was the first contributor to the *Westminster Review*, he was editor and proprietor of the *Monthly Repository* for many years, and he contributed copiously to other organs of public opinion His *Lectures of a Norwich Weaver Boy* and *Lectures to the Working Classes* had an extensive and popular circulation and did much to effect the reforms they advocated *Religious Ideas* is his most important theological work His voluminous writings, sermons, and orations are collected in the memorial edition of his works (London, 1865–68) He died June 3, 1864 Consult Garnett, *The Life of W J. Fox* (London, 1910)

FOX BAT Any large fruit-eating bat, or "flying fox," of the family Pteropodidæ, esteemed the lowest in rank of the Chiroptera There are some 70 species, inhabiting Africa, India, China, Japan, and the Malay Archipelago, where they especially abound Most are of large size, are tailless, have small, pointed ears, large eyes, noses free of lobes, and those of the type genus much resemble in physiognomy, size, and color the foxes after which they are named A Javan species spreads its wings 5 feet It is eaten by the natives These bats are wholly frugivorous, nocturnal, gregarious, and do great damage where numerous, especially to coconut and mango plantations A strong musky odor pervades, at night, the vicinity of their assemblies, and one credible writer asserts that the flying foxes are fond of drinking palm toddy from the chatties left out overnight An African genus of this family supplies the common Egyptian bat, which flocks in the chambers of the pyramids and other tombs and is figured on the monuments, it is *Xantharpia ægyptiaca* An Austro-Malayan genus is termed *Harpia*, in reference to the supposition that a bat of this sort is the basis for the harpies of classic mythology Consult Wallace, *Malay Achipelago* (New York, 1898) See FRUIT BAT

FOX'BOROUGH A town in Norfolk Co, Mass, 24 miles southwest of Boston, on the New York, New Haven, and Hartford Railroad and on the Neponset River (Map. Massachusetts, E 4) It contains the Boyden Public Library The chief industry is the manufacture of straw hats, and there are also automobile-tire works and steam-gauge and spark-plug factories. The

water works are owned by the town. Pop, 1900, 3266, 1910, 3863

FOX CHANNEL. A northern reach of Hudson Bay, Canada, inclosed on the west by Southampton Island and Melville Peninsula, and on the east by Fox Land and Baffin Land (Map Canada, P 3) It has a southeast outlet through Hudson Strait and a northwest outlet through Fury and Hecla Strait It was named after Luke Fox, who explored Hudson Bay in 1631

FOX DEITY AND FOX POSSESSIONS In Chinese Asia popular belief ascribes to the fox extraordinary powers and the ability to assume human or any shape, but generally that of beautiful women, and to work all kinds of mischief, especially in love affairs Possession by the spirit of a fox is so thoroughly believed in that a standard source of revenue for Buddhist priests of certain sects is in practicing exorcism from their suffering patients, usually women The foxes in their various transformations appear to the good or evil with rewards or punishments in quite the orthodox story-book style In Japan the fox is the attendant on the food god, Inari (Rice bearer, or Rice man), and myriads of effigies of the creature in white or colored material, usually stone, may be seen near the Inari shrines Giles tells us that "in some parts of China it is customary for mandarins to keep their seals of office in what is called a fox chamber', but the character for fox is never written, the sight of it being supposed to be very irritating to the live animal A character which has the same sound is substituted, and even that is divided into its component parts, so as to avoid the slightest risk of offense This device is often adopted for the inscriptions on shrines erected in honor of the fox" Consult· Pfoundes, *Fu-So Mimi Bukoro* (Yokohama, 1875), Mitford, *Tales of Old Japan* (London, 1876), Chamberlain, *Things Japanese* (ib., 1892), Griffis, *The Mikado's Empire* (11th ed, 2 vols, New York, 1906), Smith, *Ancient Tales and Folklore of Japan* (London, 1908), Griffis, *China's Story in Myth, Legend, Art, and Animals* (ib, 1911), Davis, *Myths and Legends of Japan* (New York, 1912)

FOX DOG. A book name for a group of small South American canine animals on account of their somewhat foxlike aspect The group was defined by Mivart, *Proceedings of the Zoological Society of London* (London, 1890), as including five species, as follows

Crab-eating fox dog (*Canis cancrivorus*), Brazil

Short-eared fox dog (*Canis microtis*), Brazil

Azara's fox dog (*Canis azaræ*), Brazil to Tierra del Fuego

Small-toothed fox dog (*Canis parvidens*)

Black-tailed fox dog (*Canis urostictus*), Brazil

These animals are much alike in their foxy appearance, though rather larger in size, and having a more variegated and highly variable coat, often handsomely marked with black and dark red, than any true fox The crab-eating fox dog is common throughout the forested parts of the whole Amazon basin and gets its name from its fondness for crayfish, though these crustaceans form only a part of its fare They often collect in packs and run down deer. Azara's dog (see Plate of WOLVES AND WILD DOGS) is known throughout the whole continent east of the Andes, on the pampas and bleak shores of Patagonia (where it is called colpeo), as well as in the forests of Brazil and Guiana It has much the habits of the North American coyote, but resorts to jungles and forests much more readily Everywhere it is foxlike in its fondness for poultry, and in Paraguay it is said to destroy a great amount of sugar cane while eating only a little The small-toothed species takes its name from the diminutive size of the fourth premolar, and of the short-eared dog almost nothing is known Consult Hudson, *The Naturalist on the La Plata* (London, 1903)

FOXE, JOHN (1516–87) The English martyrologist He was born in 1516 at Boston, Lincolnshire In 1523 he entered as a student at Oxford, in 1537 he took his bachelor's and in 1543 his master's degree, and was elected a full fellow of Magdalen College (1539) He displayed at an early period an inclination for Latin poetry and wrote several plays in that language upon scriptural subjects Of these, the only one that remains, entitled *De Christo Triumphante*, was first printed at Basel in 1556 The religious movements of the times led him to study the great controversy between the Old Church and Protestantism, and, becoming a convert to the principles of the Reformation, on July 22, 1545, he resigned his fellowship In 1546 he married, and, coming to London for employment, he attracted the notice of the Duchess of Richmond, and through her influence became tutor (1548) to the children of her brother, the Earl of Surrey, who had been executed in 1547 On June 23, 1550, he was ordained deacon by Ridley, Bishop of London, and preached the doctrines of the Reformation at Reigate In 1553, when Mary came to the throne, he was dismissed by the Catholic grandfather of his pupils, and, fearing persecution for his religious opinions, he fled to the Continent On the accession of Elizabeth he returned to England in October, 1559, was ordained priest, 1560, and in May, 1563, was made a prebendary in Salisbury Cathedral and vicar of Shipton He also held the living of Cripplegate, which he soon resigned, and for a year (1572–73) he held a stall at Durham In 1575, when some Dutch Anabaptists were condemned to the flames in London, Foxe interceded for them with Elizabeth and other persons in authority, but without effect He wrote numerous controversial and other works, but the one that has immortalized his name is his *History of the Acts and Monuments of the Church*, popularly known as *Foxe's Book of Martyrs*, the first draft of which was published at Strassburg in 1554 The first English edition appeared in 1563 A later edition, with certain errors corrected, was ordered, by a canon of the Anglican convocation, to be placed in every cathedral church in England It is not a critical work, as might be supposed, and Roman Catholics deny its trustworthiness, but it was very popular and has been often reprinted The best editions are by Cattley, with introduction by Townsend (London, 1843–49), Mendham and Pratt (8 vols, ib, 1853), by Stoughton (ib, 1877), and by Berry (New York, 1907) Foxe died in London, April, 1587, and was buried in the chancel of St Giles's, Cripplegate, London There is no satisfactory life of Foxe, the first issued (1641) was very unreliable, the nearest approach to correctness is that revised by Pratt (London, 1870) Consult *Dictionary of National Biography*, vol xx (ib, 1889)

FOXE, or **FOX,** RICHARD (c 1448–1528). An English prelate and statesman, born at Ropesley,

Lincolnshire, and educated at Oxford (probably Magdalen College), and possibly at Cambridge. In Paris he made the acquaintance of Henry of Richmond, and helped him get money and men from the French King for his invasion of England. After the accession of Henry VII Foxe was one of the King's most trusted advisers and became Secretary of State, Privy Seal, and Bishop of Exeter (1487), of Durham (1494), and of Winchester (1501) He was sent to Scotland as Ambassador several times, negotiated a treaty between England and Scotland in 1487, and again in 1497, after a stout defense of his castle in Durham In the interval he had been a signer of the Treaty of Etaples (1492) and commissioner on the *Intercursus Magnus*, a treaty with Philip of Austria (1496) In 1498 and 1499 he treated with the Scottish King and made arrangements for his marriage with the Princess Margaret In the following year he was chosen chancellor of Cambridge and was master of Pembroke (1507–19) Under Henry VIII his influence gradually diminished He retired from the court in 1516 and became blind a few years after But his last years were spent well, he founded free schools at Taunton and Grantham, and at Oxford, Corpus Christi College (1516), which became a home for the new learning Foxe may have had a share in the writing of *Contemplacyon of Synners* (1499) He edited a *Processional* (1508) and translated the *Rule of Saint Benedict* (1517). Consult Cassan, *Lives of the Bishops of Winchester* (2 vols London, 1827), and Ward, *The Life of Bishop Fox* (Oxford, 1843)

FOXGLOVE
(*Digitalis Purpurea*)

FOX'GLOVE The very inappropriate name of a genus (*Digitalis*) of about 18 species of beautiful half-hardy herbaceous biennial plants of the family Scrophulariaceæ The erect stems, which bear numerous large leaves at their bases, terminate in long racemes of inflated campanulate flowers, of various colors and markings Individually foxgloves are attractive, and in masses they give character to the flower border. They succeed well in light, rich soil, not too dry, in either exposed light or in partial shade When once established, they will reproduce sufficient plants from seed to keep the border stocked One species, credited with diuretic, sedative, and narcotic properties, is officially listed in dispensatories under the name *Digitalis* (q v)

FOX'HOUND'. A small hound, trained to pursuit of the fox See HOUND, FOX HUNTING

FOX HUNTING. There are various fashions of hunting the fox In England, the home of fox hunting, and where it was practiced with specially trained dogs as early as 1750, the animal is pursued by carefully bred packs of hounds ranging in number from 25 to 40 couples, which are put by the huntsmen into a covert or wood where it is known or thought the fox has his earth. He would elude the hounds almost invariably were it not for the scent left in the air along his track One or another hound is sure to come across the scent and give tongue, so that the remainder of the pack quickly follow They break cover and are joined outside by the horsemen who follow the chase The fox will, as a rule, go down wind and make straight for some spot where he can baffle the hounds by getting under cover or into an earth where they cannot follow him Some hunters believe that a fox will deliberately employ ruses of various kinds to throw the hounds off the scent Sometimes, in England, he arrives at his earth only to find that it has been filled up by the "stopper," and he has to make off on another venture Sometimes he is killed in the open

The kenneling and maintenance of hounds and huntsmen and the establishments kept up in the most favored neighborhoods necessitate an immense expenditure annually. The most important hunts in England are the Belvoir Castle, the Quorn, the Pytchley, and the Cottesmores Leicestershire also is a favorite hunting county, but the sport is practically general throughout England and in a lesser degree in Ireland In America the Virginian colonists early followed the English method of fox hunting, with the difference only that the pack was made up by each gentleman bringing his own hounds with him The sport was common in the Southern States up to the time of the Civil War, and there are still sections where it is conducted much as in the old days In Maryland the English foxhound was crossed with the Irish staghound to give him the necessary endurance for more difficult conditions, and the records of fox hunting in Queen Anne County go back to 1650 Dissatisfied with the gray native fox, the colonists in 1738 imported red foxes and let them loose along the shores of the Chesapeake They multiplied rapidly, and the Baltimore Hounds, established in 1818, have always been among the most famous in the South The English pack has been discarded, and the Magnes strain, a distinctly Maryland dog, adopted by the Elkridge Club, the most prominent in Maryland Pennsylvania had the first organization, the Gloucester Fox-Hunting Club, established in 1766 The American hound is faster and better than the English dog and pecul-

larly well adapted for his work In America a 'kill" is an exception with the average hunt "Earths," as the holes in the ground are called, are never "stopped" or closed, as in an English fox-hunting country, and it is very rarely that an attempt is made to dig out a fox who has taken refuge in one Particularly is this true where the fox has made a straight, true race Occasionally it happens that a fox becomes known and is given a name, owing to the frequent sport he has afforded the hunt and his exceptional skill in making his escape

Where foxes are not found, or it is desirable to spare the cubs, drag hunting is a favorite sport as well as an excellent training for young horses, dogs, or riders A course from point to point is mapped out, and a good rider, well mounted, is sent over it dragging on the ground as he goes a bag of aniseseed or a red herring The hounds are cast off and pick up the scent with as much avidity and certainty as if it were that of a fox The riders follow the hounds on horseback, and if the pace of the hounds is good, and the course suitable, a very effective and exhilarating ride is the result The chronicles of drag hunting go back to the reign of Charles II, farther back in fact than the existence of any of the great foxhound packs to-day, and its practice has continued ever since See HORSE, HORSEMANSHIP, HUNTING Consult Paget, *Hunting* (London, 1900), Somerville, *Slipper's A B C of Fox Hunting* (ib, 1903), Higginson and Chamberlain, *Hunts of the United States and Canada* (Boston, 1908), Vyner, *Notitia Venatica*, rev ed by Blew and Bradley (2 vols, London, 1910), Radcliffe and Blew, *Noble Science* (2 vols, New York 1912), and the elaborate article under "Hunting," in *The Encyclopædia of Sports and Games*, ed by the Earl of Suffolk and Berkshire (London, 1911).

Fox Hunting, in law As one of the national sports of Great Britain, fox hunting is the subject not only of social usages, but of legal rules Persons who kill foxes by traps or guns are visited with social ostracism, while those who hunt them with horses and hounds are exempted by statute from penalties for trespass within lands of others in certain cases A master of hounds, as well as one who follows hounds in fox hunting, is generally answerable civilly, however, for damage done to the property of others A fox is not the subject of absolute ownership until killed or reduced into possession, and therefore not the subject of larceny A person may acquire a qualified property, however, in tame foxes, and for injuries done by such animals he should be held liable, as for those inflicted by other *feræ naturæ* (q v)

Until recently the legal status of the fox in the United States has been that of a noxious wild animal, liable to killing at sight by trap, gun, or dog With the introduction of fox breeding and fox hunting upon large private estates has come a change in legal policy, and statutes have been enacted prohibiting the killing of foxes during certain months. Laws against cruelty to animals have been invoked to prevent the hunting of captive foxes by dogs Consult *Commonwealth* v. *Turner* (145 Mass 296, 1887); *New York Session Laws* (1901, chap 559), Oke, *Handy Book of the Game Laws* (London, 1897)

FOX ISLANDS. Another name for the Aleutian Islands (q v) in general and specifically for the easternmost group

FOX RIVER A river of Wisconsin, rising in the southern part of the State, in Green Lake County (Map Wisconsin, E 4) It flows first in a southwesterly direction to within a few miles of the town of Portage, on the Wisconsin River, with which it is connected by a ship canal From this point the Fox flows nearly due north to Lake Buffalo in Marquette County, whence its course is generally northeast to its confluence with the Wolf River, whose southeasterly direction it follows for about 8 miles to Oshkosh, where it empties into Lake Winnebago As the outlet of that lake it flows northward and empties into Green Bay, an arm of Lake Michigan It is navigable for a considerable part of its course and, through the medium of the canal connecting it with the Wisconsin, forms a link between the navigation systems of the Mississippi and the Great Lakes The lower part of the Fox is marked by numerous rapids, furnishing great water power Its total length is over 250 miles

FOX SHARK See THRESHER SHARK

FOX SNAKE (so called from its color) An American harmless snake (*Coluber vulpinus*) inhabiting only the northern part of the Mississippi valley It reaches 6 feet in length, is robust, and, although harmless, is easily irritated, and then shows more pugnacity and courage than almost any other of its tribe It feeds altogether upon small mammals, up to the size of a half-grown rabbit, and does farmers much service by killing great numbers of mice Its color above is light brown, blotched on the back with chocolate, each blotch covering a space three or four scales long and bordered with black Smaller and rounder blotches mark the sides and yellowish abdomen It is locally known also, as the pilot snake, very likely by vague confusion with the copperhead Consult Hay, *Seventeenth Annual Report, State Geologist of Indiana* (Indianapolis, 1892), and Ditmars, *The Reptile Book* (New York, 1907)

FOX SPARROW (so called on account of its color) One of the largest and handsomest of North American sparrows (*Passerella iliaca*), distinguished by the rust red of its plumage, purest and brightest on the rump, tail, and wings, and elsewhere on the upper parts appearing as streaks on an ashy ground, below it is white thickly marked with rust red It is a migrant, passing to northern Canada to breed, and uttering on its passage in early spring a loud and sprightly song, more like that of a thrush than a sparrow It makes its nest on the ground, in the protection of thickets, and lays thickly spotted eggs In the Eastern United States and Canada only one form of fox sparrow (*Passerella iliaca*) is found, but in the mountainous regions of California and other parts of the Pacific coast seven additional subspecies have been differentiated

FOX SQUIRREL (so called on account of its color). The large rufous squirrel of the Mississippi valley See SQUIRREL

FOX'TAIL' GRASS. A name applied to two very dissimilar grasses of the genera *Alopecurus* and *Setaria* They bear a general resemblance to timothy, with which they are closely related The species of *Alopecurus*, which number about 20, are natives of temperate countries of both the Northern and Southern hemispheres, and several are American. Meadow foxtail

grass (*Alopecurus pratensis*), which has an erect smooth culm about 1½ to 2½ feet high, and a cylindrical, obtuse, spikelike panicle abundantly covered with silvery hairs, is one of the best meadow and pasture grasses in Europe and introduced into America It does not arrive at full perfection till the third year after it is sown It bears mowing well and upon good soils yields a large crop and is reckoned a good grass for lawns It is very hardy and bears drought well The jointed foxtail, or water foxtail (*Alopecurus geniculatus*), with an ascending culm bent at the joints, is very common in moist places, and cattle are fond of it, but it is a small grass, growing but a foot or two high The slender foxtail grass (*Alopecurus agrestis*) is a short-lived perennial of little value except for light sandy soils, on which it is sometimes sown *Alopecurus occidentalis* is a native of the United States and would doubtless prove valuable under cultivation in the Rocky Mountain region and elsewhere These grasses are all valuable, but should be sown in mixtures

The other class of foxtail grass belongs to the genus *Setaria* Other generic names have been given them, but this name is given the preference under international botanical rules They are mostly considered as weeds and are more or less troublesome, although when young they are eaten by stock, and the seeds of some are gathered There are about 35 species, some of them exceedingly valuable They are distributed throughout all warmer and temperate regions The Hungarian grass or millet (*Setaria italica*), with its varieties, some of which are the German millet, golden millet, etc, is extensively cultivated for its forage and seed The latter is employed as human food in some countries, as in India, Russia, etc The giant millet (*Setaria magna*) grows in wet places from Delaware to Florida The common species, yellow foxtail (*Setaria glauca*), green foxtail (*Setaria viridis*), and bristly foxtail (*Setaria verticillata*), are weeds that are more or less abundant in fields and gardens of nearly all temperate countries *Hordeum murinum* is called foxtail grass in California and elsewhere

FOX TERRIER A terrier, usually white with black or tan markings, originally used for unearthing foxes, but now principally as a pet See TERRIER

FOY, JAMES JOSEPH (1847–1916). A Canadian lawyer and statesman He was born in Toronto and was educated at St Michael's College in that city and at Ushaw College, Durham, England After returning to Canada he studied law and was called to the bar in 1871 He practiced his profession in Toronto and became one of the leaders of the Ontario bar Actively interested in politics, his sympathy with Irish Home Rule led to his appointment in 1896 as a delegate to the Irish Nationalist Convention, Dublin In 1898 he was elected a Conservative member of the Ontario Legislature In 1905 he was appointed Commissioner of Crown lands in the administration of Sir James P Whitney (q v), but within a year resigned that office to become Attorney-General of Ontario He was a delegate to Interprovincial Conferences at Quebec (1906) and Ottawa (1910) and to the Federal Conference on Education, London, England (1907) In 1911 he was for a short time acting Premier of Ontario.

FOY, fwa, MAXIMILIEN SÉBASTIEN (1775–1825) A distinguished French general and statesman. He was born at Ham, in Picardy, Feb. 3, 1775 He studied at the artillery school of La Fère and was one of the volunteers of 1791, and during the next nine years served with distinction under Dumouriez, Moreau, Schoenbourg, and Masséna In 1800 he was made adjutant general in the Army of the Rhine, which marched through Switzerland into Italy, where he commanded the vanguard of the army in 1801 In 1805 he served under Marmont in the Austrian campaign Two years later Napoleon sent him to Turkey at the head of 1200 artillerymen to assist Sultan Selim against the Russians and British Under the direction of the French Ambassador, General Sebastiani, Foy defended Constantinople and the Strait of the Dardanelles, forcing Duckworth, the daring British admiral, to retire with loss. After 1808 he fought throughout the Peninsular War, at first under Junot and then as general of division under Soult and Masséna He distinguished himself in the retreat into France and was severely wounded at Orthez In 1810 Napoleon made him general of a division In the campaign of 1815 he commanded a division on the field of Waterloo, where he was wounded for the fifteenth time In 1819 he was elected deputy by the Department of Aisne In the Chamber he was the constant advocate of constitutional liberty and showed great rhetorical talent and knowledge of political economy He distinguished himself particularly by his eloquence in opposing the invasion of Spain in 1823 In 1824 he was returned to the Chamber by three constituencies Madame Foy published in 1827, from her husband's papers, *Histoire de la guerre de la péninsule* In the previous year appeared his *Discours* with a biography Consult Vidal, *Vie militaire et politique du général Foy* (Paris, 1836), and Girod de l Ain, *La vie militaire du général Foy* (ib, 1900)

FOYATIER, fwa'ya'tyā', DENIS (1793–1863). A French sculptor, born at Bussière (La Grande), Loire First instructed by Marin at Lyons, he studied afterward under Lemot, and from 1817 at the Ecole des Beaux-Arts in Paris For the statue of a "Faun" he was awarded the gold medal in 1819, and thenceforward executed numerous commissions for public buildings and churches in Paris and other cities His more noteworthy works include a statue of "Spartacus" (1827, Tuileries Gardens), which established his reputation, the monument of Colonel Combes at Feurs (Loire), a statue of "St Mark," in the cathedral at Arras, "Wisdom" (1831), in the Chamber of Deputies, Paris, "Faith," in Notre Dame de Lorette, Paris, "Figures of Apostles," in the Madeleine, Paris, the great frieze in relief, on the Arc de l'Etoile, Paris, and the "Equestrian Statue of Jeanne d'Arc" (1855), at Orléans Foyatier possessed elegance and facility, but never emancipated himself from classical traditions

FOYER, fwa'yā' (Fr, hearth). In the original French sense of the word as applied to houses of amusement, a room or hall for the informal social gathering or promenading of the spectators during intermissions, usually a long, handsome hall over the entrance vestibule In some theatres there are separate foyers for the occupants of the more expensive seats and boxes, and of the galleries, in some there is also a foyer for the artists The most splendid

of all foyers is that of the Paris Opera House, by Garnier In the United States the term signifies generally a spacious lobby at the head of the main stairs rather than a separately inclosed room

FOYLE, foil, LOUGH. An inlet of the Atlantic on the north coast of Ireland, between the counties of Londonderry and Donegal It is 16 miles long, 1 mile wide at its entrance, and 9 miles wide along its south side (Map. Ireland, D 1) A great part of it is dry at low water The west side alone is navigable for vessels of 600 tons, which ascend its chief tributary, the Foyle, to Londonderry The river Foyle, formed by the confluence of the Mourne and Finn at Lifford, flows 14 miles northeast to the lough It has salmon fisheries

FRA ANGELICO. See ANGELICO, FRA

FRAAS, fras, KARL NIKOLAS (1810–75) A German agriculturist and botanist, born at Rattelsdorf, Upper Franconia, and educated at Munich In 1835 he became inspector of the court garden at Athens, Greece, and from 1836 to 1842 was professor of botany in the University of Athens. He was professor of agriculture at the University of Munich from 1847 to 1853, when he became director of the Institute of Veterinary Surgery in that city He was chief secretary of the Bavarian Agricultural Society, and in association with Liebig conducted the agricultural experiment station organized by that society Probably no other man of his time did so much to modernize agricultural methods in Bavaria, and his efforts in behalf of fish hatcheries were scarcely less noteworthy His works include *Die Schule des Landbaues* (5th ed, 1871), *Die kunstliche Fischerzeugung* (2d ed, 1854), *Geschichte der Landbau- und Forstwissenschaft seit dem 16ten Jahrhundert* (1866), *Das Wurzelleben der Naturpflanzen* (2d ed, 1872).

FRAAS, OSKAR (1824–97) A German geologist, born at Lorch He studied theology at the University of Tubingen and held pastorates in various parts of Germany But turning his attention to geology, he was successively appointed custodian of the Royal Cabinet of Natural History at Stuttgart (1854) and professor of geology (1856). Already as a student he had received a prize for a geognostic chart of Tubingen, and in 1859 he was engaged with Deffner in preparing a similar chart of Wurttemberg. In 1866 he made important archæological discoveries at Schussenried, Wurttemberg, and in 1875, on behalf of Rustem Pasha, he made the first geological survey of the Lebanon, described by him in the publications entitled *Drei Monate am Libanon* (2d ed, 1876) and *Geologische Beobachtungen am Libanon* (1878). Among his other works are *Vor der Sundflut Eine populare Geschichte der Urwelt* (2d ed, 1870), *Geognostische Beschreibung von Wurttemberg, Baden und Hohenzollern* (1882), *Geognostisches Profil vom Nil zum Roten Meer*

FRA BARTOLOMMEO See BARTOLOMMEO

FRACASTORO, fra'kas-tō'rō, GIROLAMO (1483–1553) An Italian poet and physician, born of an ancient family at Verona. At the age of 19 he was appointed professor of logic in the University of Padua On account of his eminence in the practice of medicine, he was elected physician of the Council of Trent. His Latin verse also exhibits remarkable elegance. A bronze statue was erected in his honor by the citizens of Padua, while his native city commemorated their great compatriot by a marble statue His writings in prose and verse are numerous The chief among them are *Syphilidis, sive Morbi Gallici* (1530), *De Vini Temperatura* (1534), *Homocentricorum sive de Stellis, de Causis Criticorum Dierum Libellus* (1535), *De Sympathia et Antipathia Rerum, De Contagionibus et Contagiosis Morbis, et eorum Curatione* (1546) The collected works of Fracastoro appeared for the first time in 1555

FRACK'VILLE. A borough in Schuylkill Co, Pa, 50 miles northeast of Harrisburg, on the Pennsylvania and the Philadelphia and Reading railroads (Map Pennsylvania, J 5). Coal mining is the chief industry, the Mahoney Plane, over which is hoisted some 50,000 tons of coal daily, being situated here Pop, 1900, 2594, 1910, 3118

FRAC'TION (Fr, OF *fraction*, Lat *fractio*, from *frangere*, to break, connected with Goth *brikan*, OHG *brehhan*, Ger *brechen*, AS *brecan*, Eng *break*, and possibly with Gk ῥηγνύναι, *rhēgnynai*, to break, OIr *conboing*, breaks) A fraction is commonly defined in arithmetic as one or more of the equal parts of a unit or quantity This definition, however, is not sufficient for expressions like $\frac{2}{-3}$, $\sqrt{2}$ since "2 of the -3 equal parts of unity," or "one $\sqrt{2}$th of 3," is meaningless Hence, in general, the symbol $\frac{a}{b}$, in which b is not zero, is regarded as denoting the division of a by b

A fraction is said to be irreducible, or to be in its lowest terms, when the greatest common divisor of its terms has been suppressed In arithmetic a fraction whose numerator is less than its denominator is called a proper fraction In algebra a proper fraction is one whose numerator is of less degree than its denominator In the contrary cases the fractions are called improper Numerical fractions of the older form, as ¾, are called common or vulgar fractions as opposed to the more recent form of 0 75, called decimal fractions (See DECIMAL SYSTEM) The term was originally applied to this form as opposed to the "astronomical" or "physical" fractions, i e, those on the sexagesimal system The operations with algebraic fractions are subjected to the associative, commutative, and distributive laws (q v), e g,

$$\frac{a}{b} + \left(\frac{c}{d} - \frac{e}{f}\right) = \left(\frac{a}{b} + \frac{c}{d}\right) - \frac{e}{f},$$

$$\frac{a}{b} \cdot \frac{c}{d} = \frac{c}{d} \cdot \frac{a}{b},$$

etc Fractions of the form $\frac{\frac{a}{b}}{\frac{c}{d}}$ are called complex fractions, and obey the same laws as simple fractions, e g, the complex fraction just mentioned equals

$$\frac{a}{b} \div \frac{c}{d} = \frac{a}{b} \cdot \frac{d}{c} = \frac{ad}{bc}$$

Complex fractions of the form

$$\cfrac{a}{b + \cfrac{c}{d + \cfrac{e}{f + \cdots}}}$$

are called continued fractions Such fractions are usually simplified to the best advantage by first multiplying the terms of the last fraction of the form

$$\frac{c}{d+\frac{e}{f}}$$

by the last denominator, and so working up The theory of continued fractions, however, is extensive, and the properties of such fractions are numerous In the above fraction,

$$\frac{a}{b},\ \frac{ad}{bd+c},\ \frac{a(fd+e)}{b(fd+e)+fc},\ \ldots,$$

are the simplified forms of the fraction inclusive of the first, second, and third denominator successively, and so on These are fractions evidently converging towards the true value of the given fraction It is proved in algebra that the difference between any two consecutive convergents is equal to 1 divided by the product of their denominators, that the value of the fraction lies between each successive pair of convergents and hence differs from either by less than their difference, e g,

$$\frac{6935}{2151}=3+\frac{482}{2151}=3+\frac{1}{\frac{2151}{482}}=$$

$$3+\cfrac{1}{4+\cfrac{1}{2+\cfrac{1}{6+\cfrac{1}{5+\cfrac{1}{7}}}}}$$

or, as it may be written,

$$\frac{3}{1}+\frac{1}{4}+\frac{1}{2}+\frac{1}{6}+\frac{1}{5}+\frac{1}{7}.$$

Here the convergents are

$$3,\ \frac{13}{4},\ \frac{29}{9},\ \frac{187}{58},\ \frac{964}{299},\ \frac{6935}{2151}.$$

The difference between the last two convergents is $\frac{1}{299\ 2151}=0.0000016$, hence the next to the last convergent, expressed decimally, gives the value of the original fraction correct to 5 decimal places

A fraction whose numerator is an integer and whose denominator is an integral power of 10 is called a *decimal* fraction, e g,

$$\frac{1}{10},\ \frac{1}{100},\ \frac{3505}{10000},$$

are decimal fractions, although given in the form of common fractions Such fractions admit of an abbreviated notation, e g, 0 1, 0 01, 0 3505, which notation possesses great advantages in calculation See also CIRCULATING DECIMALS

In some algebraic fractions the substitution of a particular value of the letters will make both numerator and denominator vanish Such fractions are called *vanishing* fractions, e g, the fraction $\frac{x^2-1}{x-1}$ becomes $\frac{0}{0}$ when $x=1$ The value of a fraction which assumes the form $\frac{0}{0}$ for particular values of the letters involved is, in general, found by means of the differential calculus But frequently that value may be found by simpler means, as in the above example

$$\frac{x^2-1}{x-1}=\frac{x-1}{x-1}\ (x+1)=x+1,$$

the limit of which, for $x=1$, is $1+1=2$. See LIMITS

Doubtless the notion of a fraction is nearly as old as the notion of number Among the oldest treatises on fractions is the arithmetic of Ahmes (q v), showing how the Egyptians dealt with fractions before the year 2000 B C They made extensive use of unit fractions, i e, fractions with the numerator 1. In the hieratic writing the denominator with a point above it was the symbol for such a fraction The first problem Ahmes solves is that of separating a fraction into unit fractions, e g, he finds

$$\frac{2}{9}=\frac{1}{6}+\frac{1}{18},\ \frac{2}{95}=\frac{1}{60}+\frac{1}{380}+\frac{1}{570}$$

The early fractions of the Babylonians were apparently also unit fractions, but they later developed a system which the Greek astronomers worked into the sexagesimal fractions used even yet in angle measure. In the written form only the numerator of a sexagesimal fraction was given, with a special fractional sign attached. The Greeks wrote the numerator of a common fraction below or else before the denominator thus.

$$\frac{\kappa\alpha}{\iota\zeta},\ \text{or}\ \frac{\kappa\alpha'}{\iota\zeta},\ \text{or}\ \iota\zeta'\ \kappa\alpha''\ \kappa\alpha''=\frac{17}{21}.$$

The Romans made much use of the duodecimal system, and gave special names to their fractions which corresponded to

$$\frac{1}{12},\ \frac{2}{12},\ \ldots\ \frac{11}{12}$$

To the Hindus is due the present form of the common fraction, although they generally omitted the bar between numerator and denominator. Although the sexagesimal and duodecimal fractions prepared the way for decimal fractions, the latter did not appear in their present form until early in the seventeenth century Among the first to use such fractions were Rudolf, Bürgi, and Stevin. The first general use of the decimal point is found in the trigonometric tables of Pitiscus (1612), although it had been used by Pellos (1492) in a special case. In the sixteenth century various forms were used, but after about 1600 the period or comma became quite universal

FRACTURE (Lat. *fractura*, a break, from *frangere*, to break) In surgery the term is used of the break of a bone or of partially ossified cartilage A fracture is said to be *simple* when the break is not open to the air, *compound* when it is so open, *single* when there is but one break, *multiple* when more than one break exists, *comminuted* when the bone is broken into many little pieces, *impacted* when one fragment of the bone is driven into the other, *complicated* when a neighboring joint or large blood vessel is involved in the traumatism; *complete* when the whole thickness of the bone is ruptured, *incomplete* (or green stick) when the bone is partly broken, partly bent, *intracapsular* when the break occurs within the capsule of a joint, and *transverse, oblique, longitudinal*, or *spiral*, according to the direction and

position of the break as regards the shaft of the bone

Among the external causes of fracture are accident or violence and excessive muscular action The condition known as *fragilitas ossium* occurs late in life or in early life, as a softening of the bone from disease Cancer, syphilis, scurvy, and rickets often result in altered bone structure Muscular action causes rupture of *patella* or *os calcis* (heel bone) during the endeavor to prevent falling after tripping or in running or jumping The symptoms are pain over the region, swelling and great local tenderness, change in position or shape of the part, false point of motion, crepitation (crackling, as the broken ends of the bone are rubbed together), and immobility on the part of the patient, together with increased motion secured by the examining surgeon In impacted fractures there is necessarily no crepitation, false point of motion, or mobility elicited by the surgeon Fractures must be reduced, i.e, the fragments must be put into their proper position, and they must be retained by some apparatus The splints used for retention are made of wood, tin, iron, felt, spongiopiline, gutta-percha, leather, or of bandages saturated with plaster of Paris, with starch, or with soluble glass ("water glass," silicate of soda solution) The limb is padded with cotton and the splint applied closely and rendered immovable In the case of fractured ribs a strip of adhesive plaster or a corset is applied Rest must be secured, otherwise (or, in some cases, in spite of good attention) the fracture remains ununited, when rubbing the ends together, giving mercury internally to salivation, electricity or drilling holes in the ends, or wiring the ends together must be tried, to secure union. Of late years Lane's bone plates have been much in favor among surgeons These are flat metal plates drilled with holes for screws or pegs, and are fastened directly to the injured bones, holding them immovably in place Compound fractures must be treated as described, and also as open wounds, under all antiseptic precautions Drainage of pus and discharge must be secured, as well as protection against bacterial infection. See CALLUS

The X-rays play an important part in the modern diagnosis and treatment of fracture Not only is it possible by their means to ascertain the precise position of the bones involved, but the surgeon can assure himself of their correct replacement and scrutinize the progress of healing

FRADENBURGH, frā'den-bûr'g, JASON NELSON (1843–) An American Methodist Episcopal clergyman, born at Gouverneur, N Y He graduated from Genesee Wesleyan Seminary and from Genesee College (later Syracuse University). At the seminary he was professor of mathematics in 1868–69, and at the Fredonia (N Y) State Normal School professor of ancient languages in 1869–73; and he was principal of the State Normal School at Mansfield, Pa, in 1873–75. He held pastorates at Cleveland, Ohio, and at Clarion, Pa, after 1896 He is author of *Witnesses from the Dust* (1885), *Beauty Crowned* (1887); *Living Religions* (1888), *Old Heroes* (1889), *Departed Gods* (1891), *Fire from Strange Altars* (1891); *Light from Egypt* (1897); *Life's Springtime* (1900); *History of Erie Conference* (1907), *In Memoriam, Henry Harrison Cummings* (1913).

FRA DIAVOLO, fra dē-a'vō-lō (It, Brother Devil) (?1770–1806) A celebrated Italian brigand, born in Calabria, whose real name was Michele Pezza He gathered a band of outlaws in the mountains of Calabria, in the country around Itri in Terra di Lavoro, and attacked alike strangers and villagers of the neighborhood His atrocious cruelty and the fact that he had originally been a monk gained him the name of Fra Diavolo Ferdinand of Naples summoned him to his aid against the French and made him colonel In 1799, together with Cardinal Ruffo, he tried to stir up an insurrection in Calabria In 1806 he repeated his attempt He was seized by Masséna at San Severino and was hanged at Naples as a bandit in spite of his regular colonel's commission Auber's famous opera *Fra Diavolo*, libretto by Scribe, does not pretend to the least historical truth Consult Amante, *Fra Diavolo e il suo tempo 1796–1804* (Florence, 1904)

FRA DIAVOLO An opera by Auber (q v), first produced in Paris, Jan 28, 1830, in the United States, April, 1832 (New York)

FRAENKEL, frĕn'kel, KARL (1861–) A German bacteriologist, born in Charlottenburg and educated at Berlin, Heidelberg, Leipzig, and Freiburg At Berlin he became assistant in the Institute of Hygiene in 1885 and privatdocent in 1888 He became professor at Konigsberg in 1890, at Marburg in 1891, and at Halle in 1895 With Brieger, about 1890, he proved the proteid character of extracellular toxins, and he isolated the *Pneumococcus* and, in meningitis, the *Diplococcus lanceolatus*, sometimes called by his name Among Fraenkel's published works are *Grundriss der Bakterienkunde* (1886, 3d ed, 1890, atlas, 1889, revised 1895), *Diphtheriebazillen* (1893), *Meningokokkus auf der Conjunctiva* (1899), *Spirillen des Zeckenfiebers* (1907)

FRAGA, fra'gà A town in the Province of Huesca, Spain, about 15 miles southwest of Lérida, on the river Cinca (Map Spain, F 2) It is built on a slope and has ruined walls, among its buildings of note are the town hall and the old parish church of San Pedro, once a mosque The town is in a fertile agricultural section, celebrated for its figs and pomegranates, which constitute the chief exports Stock raising and some manufacturing also are carried on Pop, 1900, 6934, 1910, 7418 Fraga, according to some authorities, is the Gallica Flavia of the Roman Empire Of considerable importance under the Moors and for a time a separate emirate, it was captured by the Christians in 1149, after having been previously taken, but retaken Fraga was specially honored in 1709 by Philip V for its loyalty in the War of the Spanish Succession

FRAGIACOMO, fra'ja-kō'mō, PIETRO (1856–) An Italian marine and landscape painter. He was born at Trieste, came to Venice in his early youth, and studied there at the Academy and under Favretto Fragiacomo is one of the leading contemporary Italian landscape painters His subjects are always Venetian and his paintings have a fine lyrical quality and an element of originality A keen observer of nature and a fine colorist, he depicts with equal mastery the sea and lagoons in many of their various aspects—barks and fishermen, the distant horizon, and the sky with its ever-varying light effects Especially noteworthy among his paintings are "Peace" (1891), in the Royal

Villa, Moriza, "Mournfulness" (1892), in the National Gallery, Berlin, "San Marco" (1899), in the Vienna Museum, "On the Seashore" and "End of a Summer's Day," exhibited at the Paris Exposition in 1900, "Harmony of Silence" (1910)

FRAGMENTAL ROCKS See SEDIMENTARY ROCKS

FRAGMEN'TA VAT'ICA'NA (Lat, Vatican Fragments) A body of law documents in part preserved in a palimpsest, now in the Vatican library They are thought to date from the time of Constantine

FRAGONARD, fra'gō'nar', JEAN HONORÉ (1732–1806) One of the most distinguished painters of the rococo period in France He was born April 5, 1732, at Grasse, in Provence the son of a glovemaker The family removed to Paris, where the lad was apprenticed to a notary At 18 he began the study of painting with Chardin, from whom he learned the rudiments of art, after which he was a pupil of Boucher, his true master He won the Prix de Rome in 1752, and after three years' prescribed preliminary study under Carl van Loo he spent four years in Italy At Rome he worked under the guidance of Natoire, but was not influenced by the Italian masters whom he copied He traveled with the Abbé de Saint Non in Naples and Sicily, making drawings for this distinguished amateur's books On their return journey to Paris (1761) they stopped at Venice, where Fragonard was influenced by Tiepolo In 1765 his "Coresus and Callirhoe" procured his admission to the Academy, and was bought by the King for reproduction in the Gobelins. Disgusted with his difficulty in obtaining payment from the King, he turned from historical to the gallant subjects popular with the aristocracy and at the theatre. His attractive personality made him a welcome guest and he lived the joyous life he depicted The celebrated "Swing," now in the Wallace collection, London, established his reputation in this genre and brought him many similar commissions In 1771 he was commissioned to decorate a pavilion for Madame du Barry at Louveciennes, the subjects depicting the "Romance of Love and Youth," in idealized representations of Louis XV and his favorite Taken in its entirety, this series is perhaps his most remarkable achievement The chief subjects represented are "The Pursuit," "The Meeting," "Memories," "The Lover Crowned," and "The Abandonment" Besides these there are five minor designs of cupids and four purely decorative designs The work was refused by du Barry, who, however, gave the artist 18,000 livres The decorations passed from the artist's possession to his friend M Maubert at Grasse, whose descendants sold them in 1898 for 1,250,000 francs They were purchased by the late J P Morgan, in 1914 were exhibited in the Metropolitan Museum, New York, and in 1915 were bought by Henry Clay Frick Fragonard undertook a similar work for the dancer Marie Guimard, but he refused to finish it Among other ambitious works of this period are "The Fête of Saint-Cloud," also called "The Marionettes," a large canvas for the Banque de France, "Blind Man's Buff" and "The Swing" (both in the Groult collection, Paris), in which the landscapes are particularly charming His happy marriage in 1769 with Marie Anne Gérard, a miniature painter of his native town and his pupil, gave rise to subjects of a domestic character such as "The Happy Mother" and "The Cradle" Admirable sepia studies of his wife and little daughter are in the Besançon library The Revolution ruined Fragonard's fortunes, and though befriended by Louis David, he preferred during the Terror to retire to Grasse On his return to Paris he was unable to adopt the cold, classic manner of the painting then in vogue and died, poor and forgotten, Aug 2, 1806

Fragonard's art is the culmination of rococo painting in France Never has the gayety, frivolity, and charm of the ancien régime been so delightfully represented His paintings are exquisite in color, free and graceful in line, and especially characterized by the jaunty pose and dainty movement of the figures The Louvre possesses 15 of his paintings, including "The Bathers," "The Sleeping Bacchante," "The Shift Withdrawn," "The Shepherd's Hour," "The Music Lesson," and "Inspiration" He is richly represented in the Wallace collection, London, by the "Fountain of Love," "The Love Inscription" (Le Chiffre d'Amour), "The Fair-Haired Child," and "The Schoolmistress", at St Petersburg are "The Stolen Kiss" and "The Farmer's Children" He is represented in many French provincial collections and there are numerous fine examples in private collections, such as "Le Billet Doux," "Mlle Colombe" (Rothschild collection London), "The Pasha," two fine portraits of the dancer Guimard, and two of Fragonard himself His drawings, especially those in sepia, of which a large number survive, are very fine He designed a delightful set of illustrations for La Fontaine's *Fables* and was also an etcher of ability, the best-known plate being "L'Armoire." —His son and pupil, ALEXANDRE EVARISTE (1780–1850), born at Grasse, studied also under David, whose style he imitated He painted historical pictures, such as "Entry of Joan of Arc into Orléans" (Orléans Museum), and several decorative paintings, in the Louvre His illustrations and designs for prints were popular during the Revolution, and he was also known as a lithographer and as a sculptor, in which latter capacity he modeled a bas-relief for the Palais Bourdon, Paris

Bibliography. The most complete biography of Fragonard is by Portalis (Paris, 1883), the latest, with admirable illustrations, is by De Nolhac (ib, 1906) Consult also De Goncourt, *L'Art du XVIIIème siècle* (ib, 1874); Nacquet, *Fragonard* (ib, 1890), Josz, *Fragonard—mœurs du XVIIIe siècle* (ib, 1901), Mauclair, in *Les grands artistes series* (n d).

FRÅHN, från, CHRISTIAN MARTIN JOACHIM (1782–1851) A German-Russian ethnologist, born at Rostock and educated in that city and at Gottingen and Heidelberg He was appointed professor of Oriental languages at the University of Kazan in 1807, and chief librarian at the Academy of Sciences, St Petersburg, in 1815 His principal works treat chiefly of the ethnology of the various races of Russia They are based upon considerable research and include. *Nova Supplementa* (1855–77), *Ueber die Russen und Chazaren* (1819); *Ibn Foszlans und anderer Araber Berichte uber die Russen alterer Zeit* (1823) *Die altesten arabischen Nachrichten uber die Wolga-Bulgaren* (1832); *Ein neuer Beleg dass die Grunder des russischen Staats Nordmannen waren* (1838), *Rapports concernant des collections orientales de l'Académie Impériale* (1838).

FRAIKIN, frā'kăn', CHARLES AUGUSTE (1819–

93) A Belgian sculptor, born at Herenthals, Province of Antwerp He studied at the Academy of Brussels and under Puyenbroeck He modeled a large number of monuments for squares, public buildings, and churches, among the best of which are 11 statues for the Hôtel de Ville, Brussels, the statues of the counts Egmont and Hoorn, for the great square of that city (now in the Place du Petit Sablon), the allegorical statues of the "City of Brussels," in the Place Rouppe, the fine tomb of Queen Marie Louise of Belgium at Ostend His ideal works include "Venus with the Dove", 'Captive Love," in the Brussels Museum, "Venus Anadyomene," in the Royal Palace, Brussels Good examples of his work as a portraitist are a bust of King Leopold, in the Château of Laeken, and of Queen Marie Henriette, in the Royal Palace, Brussels Plaster casts of all his works are in the Musée Fraikin at Herenthals They are spirited in conception and show variety of style and facility of execution, his ideal statues have much grace and voluptuous charm.

FRAKNÓI, frŏ'knō-ī, VILMOS (1843–) An Hungarian historian, born at Urmény He was educated at the University of Pest, entered the priesthood and was appointed professor at Gran in 1865, and was made librarian of the National Museum in 1875, titular Bishop of Arbe in 1892, and chief inspector of Hungarian museums and libraries in 1897 In 1900 he became inspector of the Hungarian Historical Institute at Rome, which he had founded His works, based upon exhaustive researches and mostly written in the Hungarian language, but also appearing in German versions, deal with Hungarian history, especially in the fifteenth and sixteenth centuries *Peter Pazman and his Time* (1867–72), *A Popular History of Hungary* (1873), *Matthias Hunyady* (1890), *The Relations of Hungary to the Holy See* (1901–03).

FRAMBŒSIA See YAWS

FRAME (AS *fremman, fremian,* Icel. *framja, frama,* OHG *fremman, freman,* to advance, further, from AS *fram, from,* Icel *framr,* Ger. *fromm,* earnest, pious, connected with AS *from, fram,* Goth, Icel., OHG *fram,* from Gk πέραν, *peran,* Skt *para,* beyond). The boxlike covering of any kind of hotbed, flued pit, or cold pit, to protect or forward plants at seasons of inclement weather Frames are usually made of wood and covered with glass or cloth The popular form is 6 × 12 feet and several inches higher at the rear than in front The word "cold" used to qualify "frame" or "pit" implies the absence of other heat than that from the sun. See HOTBED

FRAMING The jointing, putting together, or building up of the skeleton or frame of any structure, used particularly in speaking of steel or wooden buildings and ships (qq v)

FRAMINGHAM, frā'mĭng-hăm A town in Middlesex Co., Mass, including the villages of Framingham Centre, South Framingham, Saxonville, and Nobscot, 21 miles west of Boston, on the Boston and Albany and the New York, New Haven, and Hartford railroads (Map Massachusetts, E 3) It is the seat of a State normal school and has a public library, an historical and natural history society with a valuable collection, an almshouse, a public and two private hospitals, and a Home for the Aged South Framingham is the principal business centre and has manufactures of tags, crêpe paper, gummed labels, paper boxes, boots and shoes, rubber and straw goods, Saxonville manufactures worsted and woolen yarns, wool blankets, and worsted cloth Other manufactures of the town include steam boilers, sugar and coffee machinery, heaters, agricultural implements, etc The government is administered by town meetings The water works are owned by the municipality Framingham was settled about 1647, was known as Danforth's Plantation until 1700, when it was incorporated under its present name (from Framlingham, England) Pop, 1900, 11,302, 1910, 12,948, 1914 (U S est), 13,648, 1920, 17,033 Consult Barry, *History of Framingham* (Boston, 1847), and Temple, *History of Framingham* (Framingham, 1887)

FRA MOREALE, mō'rĭā-a'lā See MONTREAL D'ALBANO

FRAMP'TON, SIR GEORGE JAMES (1860–) One of the foremost English sculptors of the early twentieth century He studied at the Lambeth Schools under W S Frith, at the Royal Academy, and in Paris under Mercié and the painter Dagnan-Bouveret There was nothing unusual about his early work in marble and bronze, except its sound technical ability It treated ideal subjects, beginning with "Socrates Teaching" (1884) and ending with the striking "Children of the Wolf" (1892) He then declared himself against all "white sculpture" and devoted himself to color effects in all manner of material, such as the female bust, "Mysteriarch," and the stately statue, "Dame Alice Owen," in bronze and marble, the "Lamia," in bejeweled bronze and marble, and the youthful "St George," mounted on an agate globe with mother-of-pearl background He excels especially in purely decorative work e g, the terra-cotta façade of the Junior Constitutional Club, London, the sculptures of the Glasgow Art Gallery; and the remarkable bronze memorial to Charles Mitchel, shipbuilder, at Newcastle Although primarily devoted to ideal and decorative sculpture, he modeled a number of portrait statues of great originality, the best known of which is the colossal bronze Queen Victoria at Calcutta Frampton is one of the most gifted and original sculptors that Great Britain has ever produced Besides being the greatest decorative genius of the school, he excels also in modeling His figures are highly suggestive of intellect and imagination, and show pathetic gravity of expression, but the designs often lack unity He became a member of the Royal Academy in 1902, was president of the Society of British Sculptors in 1911–12, and was knighted in 1908 He was chosen honorary member of the Milan and other academies, and among his many awards was the grand medal of honor at the Paris Exposition of 1900 Consult Spielmann, *British Sculpture and Sculptors of Today* (London, 1901)

FRANC, frăNk (Fr, derived from the device, *Francorum Rex,* King of the Franks, struck by King John II on the coin in 1360). The unit of the monetary system of France and of the States of the Latin Monetary Union—Belgium, Switzerland, Italy, and Greece At the present time the franc is in fact the twentieth part of the 20-franc gold piece, or 2902 grams of pure gold, equivalent in United States money to 19 3 cents When the present monetary notation was adopted in France, in 1795, supplanting the former livre tournois, the franc was a silver coin, nine-tenths fine, weighing five grams Such coins were discontinued in 1865, when the franc

coin was made a token, 835 fine, without change of weight As a silver unit it still remained in its multiple the five-franc piece, nine-tenths fine, weighing 25 grams In 1876 the coinage of the five-franc piece was discontinued Silver coins of 5, 2, and 1 franc, and ½ franc, are still in general use, but they are all, strictly speaking, tokens, gold having become the standard and being represented in the coinage by pieces of 10 francs and 20 francs The franc is theoretically divided into 100 centimes, but the smallest coin circulated in France is the five-centime piece, often called by the old term sou In Italy the equivalent coin is called the lira, and in Greece the drachma In other countries not in treaty relations with France, the same unit prevails; in Finland, the marc, in Spain, the peseta, in Rumania, the lei, in Venezuela, the bolívar See LATIN UNION

FRANC, frank, MARTIN LE (1410–61) A French poet, born in Normandy He became secretary to the Duke of Savoy, afterward Pope Felix V, and through him obtained various lucrative appointments, such as secretary to Nicholas V Despite its tedious detail, his long poem, *Le champion des dames* (1530), is valuable for its contemporary references and its vivid local color, and the same may be said of his prose work, *L'estrif de fortune et de vertu* (1519).

FRANÇAIS, fraN'sâ', FRANÇOIS LOUIS (1814–97) A French landscape painter, lithographer, and engraver. He was born at Plombières, Vosges, and studied at the Ecole des Beaux-Arts and under Corot and Jean Gigoux, and exhibited first in the Salon of 1837. Many of his lithographs, such as "The Bark of Don Juan," after Delacroix, are remarkable, and he was also an excellent engraver on wood, but it is as a landscape painter that he is best known Although many of his subjects are Italian, he is particularly the painter of the banks of the Seine and the country about Paris Français belongs to no school, he is an idealist, from the poetical quality of his brush, and a realist because of the restraint and decision of his work His pictures include "The End of Winter" (1853, Louvre), "Orpheus" (1863), "Daphnis and Chloe" (1872), his masterpiece, "Evening" (Montpellier). He received first-class medals in 1848 and at the Paris expositions of 1855 and 1867, and medals of honor at the Paris Exposition of 1878 and the Salon of 1890 He was elected to the Institute in 1867

FRANCAVILLA (fraN'ka-vēl'la) **FONTANA** A city of south Italy, in the Province of Lecce, midway between Taranto and Brindisi (Map Italy, F 4) It has a large castle, manufactures cloth, leather, and leather goods, and markets oil and wine Pop. (commune), 1901, 20,422, 1911, 21,527

FRANCE. A republic of western Europe, lying between lat 42° 20′ and 51° 5′ N and long 4° 48′ W and 7° 31′ E from Greenwich It is bounded on the north by the English Channel, Strait of Dover, and North Sea, on the northeast by Belgium and Luxemburg, on the east by Germany, Switzerland, and Italy, on the south by the Mediterranean and Spain, and on the west by the Bay of Biscay, Atlantic Ocean, and the English Channel In outline the country is roughly hexagonal, and its perimeter is about equally distributed between seacoast and frontier The extreme length from the North Sea to the Pyrenees is about 600 miles, the greatest breadth from the extremity of Brittany to the Vosges is about 550 miles, and diagonally, to Mentone on the Mediterranean, about 675 miles France ranks fourth in size among European countries, its area, usually stated at 207,054 square miles, is according to the determinations of the War Department, 536,463 7 square kilometers, or 207,128 6 square miles For national colors, see Plate of FLAGS, and for national coat of arms, see Colored Plate accompanying HERALDRY

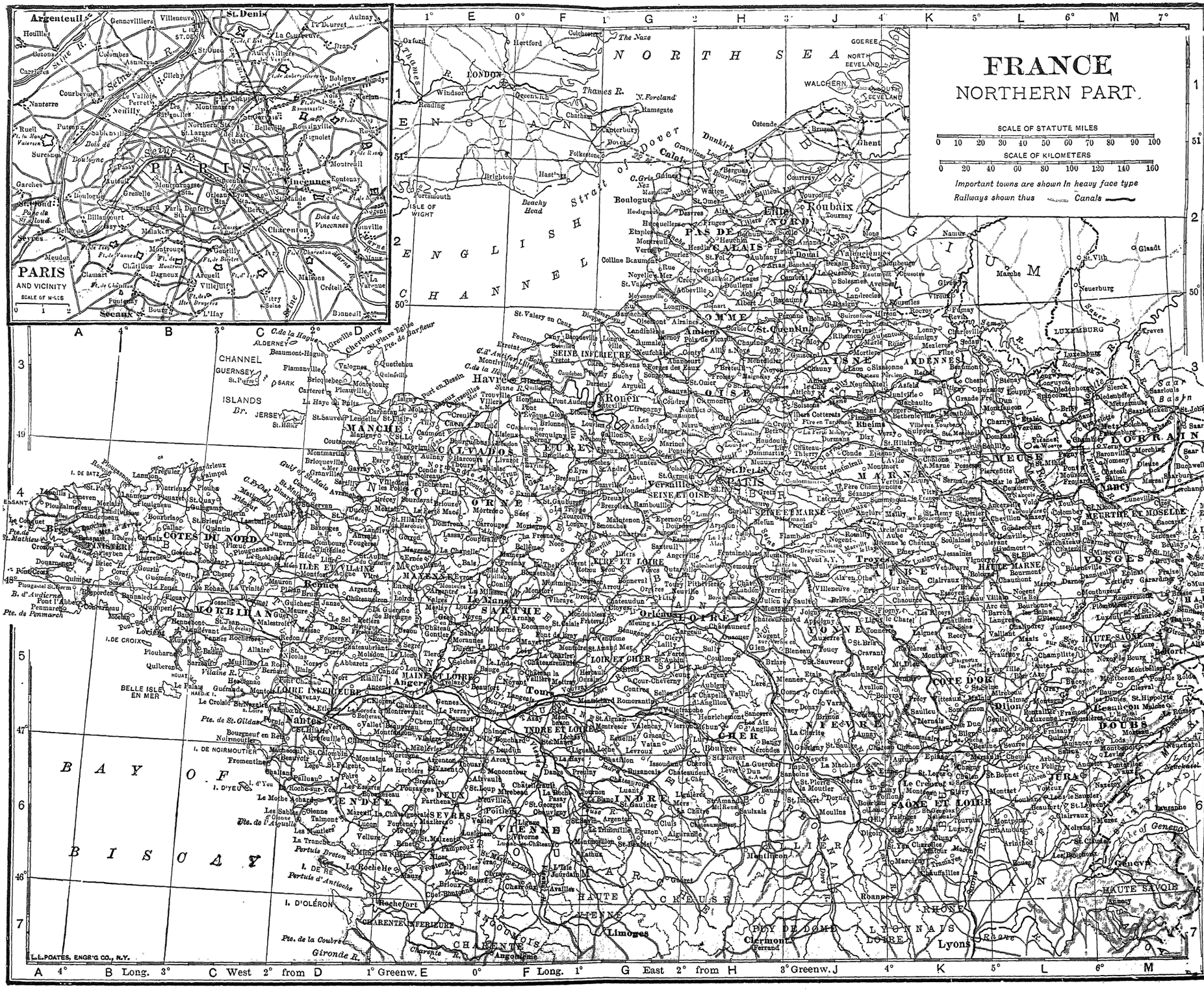
Topography France possesses natural boundaries throughout and is to a high degree an independent physical unit The eastern border is girdled by the ranges of the Alps, the Jura, the Vosges, the Rhenish Highlands, and the Ardennes, which separate France from the countries of central Europe, the Spanish frontier is defined throughout its extent by the Pyrenees The ranges on the east are broken in places by gaps and passes, through which commercial communication is maintained with the bordering states The Pyrenees, however, present a great unbroken wall, communication with Spain being had around their extremities On the northwest, west, and southeast the boundaries are formed by open seas, the total coast line measuring about 1950 miles Much of the coast line is unbroken by important inlets, with the result that good harbors are comparatively few Most of the harbors are river ports or are protected by breakwaters, as at Cherbourg The northwest coast, which confronts the southern shores of England, is intersected by the deep inlets of the Somme and the Seine and has an irregular course, owing to the prominent peninsula of Normandy (called Cotentin), to the many capes, and to minor indentations It varies in character from low, sandy stretches, as on the North Sea, to bold, rocky cliffs, such as are exposed in the Pays-de-Caux, between Dieppe and Havre, and on the north coast of Brittany Between the latter peninsula and Normandy is the broad indentation occupied by the Gulf of Saint-Malo, with the Channel Islands (q v), which are held by Great Britain, although physically belonging to the mainland. The west coast, from Pointe Saint-Mathieu, the extremity of Brittany, to the Gironde, maintains an irregular outline and is intersected by the bays of Douarnenez, Quiberon, Bourgneuf, by the Pertuis Breton, and the Pertuis d'Antioche, and by the estuarine mouths of the Loire and the Gironde The low and generally sandy shore is fringed by islands, of which the largest are Ouessant (Ushant), Belle Ile, Ile de Noirmoutier, Saint-Martin de Re, and Ile d Oleron Southward of the Gironde the coast, formed by a straight, monotonous stretch of dunes, is bordered by the arid moors of the "Landes," the Bassin d'Arcachon being the only important indentation in this section The Mediterranean coast, by which France enjoys easy access to Africa and the east, stretches in a broad double curve from the Pyrenees to the Maritime Alps. Bold and rocky on the extreme west, it soon becomes low and sandy, inclosing numerous lagoons, but without good harbors Near the middle the Rhône has built its delta seaward and incloses between its mouths the island of Camargue East of the Rhône the shore conforms to the projecting spurs of the Provençal Highlands and of the Maritime Alps, which shelter the harbors of Marseilles, Toulon, Cannes, and Nice.

The physiography of France, broadly considered, falls naturally into regions that are determined, in their position and surface features, by the events of geological history There are, thus, the regions of highlands on the eastern and southern borders, the great central plateau in the south-central part west of the Rhône valley, the lower plateau of Normandy and Brittany, and the extensive plains in the north and west, occupied by the basins of the Seine, the Loire, and the Garonne A line drawn diagonally across the country from Bayonne in the southwest to the Ardennes of south Belgium in the northeast roughly divides the rolling low plains to the west of it from the central plateau and highlands to the east of it The mean altitude of the country is about 1000 feet, but the western section averages less than 650 feet As the chief relief is concentrated in the south and east, the land slope is towards the Atlantic, the Rhône alone, of the large rivers, takes a southerly course into the Mediterranean

The Alps on the southeast border are the most important highlands in the country They extend from the Mediterranean north to Lake Geneva, a distance of 150 miles, and with the flanking chains and foothills they occupy the entire area between Italy and the Rhône valley The principal groups are the Maritime, the Cottian, the Graian, and the Pennine Alps, or, according to their situation in former provinces, they may be divided into the Alps of Provence, Dauphine, and Savoy The Maritime Range on the extreme south enters France from Italy, where it has its culminating point, the highest peak across the border, French territory, being the Cime du Diable, 8816 feet To the north the ranges increase in elevation, and the Cottian Alps are crowned by the Aiguille de Scolette, 11,500 feet above the sea Across Mont Genèvre a pass leads from the valley of the Durance, in France, to that of the Dora Riparia, in Italy, which has been used as a highway since ancient times West of the Cottian Range is the small group of the Oisans, culminating in Les Ecrins, 13,462 feet, and north of it are the lofty Graian Alps, snow-capped and carrying glaciers on their rugged slopes, with a crest averaging nearly 10,000 feet in altitude Near their southern end are the Pass of Mont Cenis (6850 feet) and the railway tunnel of the same name, now the principal line of communication with Italy The Alps culminate in Mont Blanc (15,781 feet) of the Pennine Range, and thence northward to the shores of Lake Geneva there is a gradual decrease in altitude Interrupted by the valley of the Rhône, the line of highlands is continued on the north by the Jura Mountains, which are formed by several parallel groups resting upon a plateau tilted towards the west, and thus falling to the valleys of the Saône and the Doubs The Jura Mountains follow a nearly north direction at first, but gradually bend to the east and enter Swiss territory, where, or on the frontier of France, they attain their maximum elevation of over 5600 feet (Crêt-de-la-Neige) The Vosges, separated from the Jura by the gap at Belfort, now form a part of the French frontier, their eastern slopes fronting upon Alsace, which since 1871 has been incorporated into the German Empire Their crest is a flat-topped mountain ridge, broken by peaks of 4000 to 4700 feet elevation, connecting in the southern part with the Monts Faucilles, a low range that extends westward in the form of an arc between the sources of the Saône and the Meuse and Moselle A northern offshoot of the latter highlands stretches along the left bank of the Meuse and is continued by the Forest of Argonne to the low plateau of the Ardennes, of which only a small portion lies in France The Pyrenees, rising with great abruptness on the south border, extend from the Mediterranean to the Bay of Biscay A height of 9100 feet is attained in Mont Canigou, near the Mediterranean, and farther west this altitude is exceeded by Montcalm (10,000 feet), Pic Long (10,475 feet), Pic du Midi (9400 feet), and by others on the French side, and by still loftier elevations south of the border In its conformation the chain is a true sierra, having a uniform crest line that is notched by slight gaps, usually but little below the level of the neighboring peaks Passes, practicable for railways, are found along the low coast strips at the extreme ends, but between these points there are but few highways leading from France to Spain that can be traversed without great difficulty

The central plateau, south of the Loire and west of the Rhône, is the chief physiographic feature of central France The plateau rises sharply from the Mediterranean and Rhodanian depressions in several groups of highlands that are collectively known as the Cevennes Beginning on the southwest with the Montagne Noire, at the passage of Naurouse, between the Aude and the Garonne, which lies at the base of the Pyrenees, the elevations include in their generally northeasterly course Monts de l'Espinousse, Monts Garrigues, and the Cévennes in the lesser sense, terminating with Mont Lozère (5584 feet) Northward the range is continued by the Monts du Vivarais, with the volcanic Mont Mézenc (5755 feet), by the mountains of Lyonnais and Beaujolais, and by a succession of highlands to the elevated region of Côte d'Or, and the plateau of Langres, between the Saône and the sources of the Seine The central plateau gradually falls off in elevation to the northwest, but in Auvergne it has been broken by volcanic eruptions The denuded cones of the extinct volcanoes are still conspicuous in numerous minor elevations near Clermont-Ferrand, and in the more massive mountains—Puy-de-Dôme (4806 feet), Mont Dore (6187 feet), and Plomb du Cantal (6096 feet) South of the volcanic region the plateau receives a special character by the Causses, sterile limestone table-lands whose surface has been dissected by erosion into deep gorges and ravines North of this region the low mountains of the Morvan Range divide the waters of the Loire and the Saône Bordering the central plateau are the fertile plains of central France on the north, the plains of Périgord and Poitou on the west, and the plains of Gascony across the Garonne on the southwest

Normandy and Brittany (ancient Armorica) are to be considered as an isolated plateau whose surface, worn down by long-continued erosion, has a general altitude of less than 1000 feet In Brittany the plateau, much less dissected than in Normandy, is broken by two lines of monadnocks—the Monts d'Arée and the Montagne Noire—which run out to the two promontories that inclose the Bay of Douarnenez The Monts d'Arée on the north culminate in Saint-Michel (1285 feet), the highest peak in Brittany, and the Montagne Noire in Menez Horn (1080 feet).


FRANCE
NORTHERN PART.
SCALE OF STATUTE MILES
0 10 20 30 40 50 60 70 80 90 100
SCALE OF KILOMETERS
0 20 40 60 80 100 120 140 160
Important towns are shown in heavy face type
Railways shown thus
Canals
PARIS AND VICINITY
SCALE OF MILES
NORTH SEA
ENGLISH CHANNEL
Strait of Dover
BAY OF BISCAY
CHANNEL ISLANDS
L.L.POATES, ENGR'G CO., N.Y.

In Normandy the elevations are grouped along no general lines but the surface shows an alternation of low hills and open valleys The woodland region of the Norman Bocage, in the Department of Calvados, attains an elevation of 1000 feet in a few places, and in the Forest of Ecoves, near Alençon, Mont des Avaloirs rises to a height of 1370 feet

Corsica, a part of France since 1768, belongs physically to Italy, with which it is united by a submarine plateau It is traversed from north to south by a mountain range, which descends on the east to a narrow coastal plain, while westward it sends out spurs that project into the sea as promontories inclosing many good harbors The interior of the island is wild and rugged and is dominated by peaks of considerable altitude, the highest being Monte Cinto, 8900 feet above the sea

Hydrography The large drainage systems of France are those of the Rhône, the Garonne, the Loire, and the Seine the northeastern part of the country is included in the basins of the Moselle and the Meuse, which flow northward into Belgium The Rhône, which in point of discharge is the largest of the rivers, rises in Switzerland and enters France at the gap between the Alps and the Jura, flowing first southwesterly into the Rhodanian depression, where it is joined by its largest tributary, the Saône, from the north, and then sweeping to the south towards the Mediterranean Through the Isère and Durance it drains most of the Alpine region of France, but has no important branches from the west The basin of the Rhône covers an area of about 38,000 square miles The Garonne, the Loire, and the Seine follow the general land slope and drain into the Atlantic The Garonne, with a basin of 33,000 square miles, rises on the Spanish side of the Pyrenees and flows in its middle course along the southwestern edge of the central plateau, from which it receives the Tarn-Aveyron, the Lot, and the Dordogne At its mouth it widens to form the estuary of the Gironde The Loire, the longest of the rivers, drains the great basin of west-central France, with an area of about 46,000 square miles It rises on the slopes of Mont Mézenc, in the Cévennes, about 30 miles from the Rhône, and thus crosses the whole breadth of the central plateau The chief branches of the Loire are on the north, the Mayenne, Sarthe, and Loir, which unite to form the Maine, and on the south, the Allier, Cher, Indre, and the Vienne-Creuse The Seine collects the waters from the northern part of the central plateau, over an area of about 30,000 square miles From the north it is joined by the Oise, Marne, and Aube, and from the south by the Yonne and Eure Besides the four great river systems, there are several minor streams of importance, such as the Somme, Orne, Vilaine, Charente, Adour, Aude, and Hérault, the last two flowing into the Mediterranean More than 200 rivers are officially reported as navigable, for an aggregate distance of about 6000 miles Even the largest, however, show such fluctuations in volume between periods of floods and low water that they are not continuously navigable except by light-draft boats The Seine is most important for commerce, being navigable for river boats beyond Paris The utility of the natural waterways is much augmented by the extensive systems of canals that connect them, the Seine is connected with the Meuse and Moselle providing waterways across France to Belgium and Germany, the Seine is also connected with the Loire and Saône, the northwestern seaports of Brest and Saint-Malo are joined by river and canal with the Loire, and the Gironde is extended by canal to the Mediterranean About one-fourth of France's internal trade is carried on the waterways There are but few lakes in France Aside from the brackish or fresh-water lagoons along the coast, the largest are in the Alps within the Rhône Basin The largest of these, Lake Geneva, belongs only in part to France, the north shore lying in Switzerland Other well-known lakes of this region are Annecy and Bourget

Climate The climate varies considerably between the coastal and the elevated interior regions, but it is characteristically temperate On the Atlantic seaboard the temperatures are equalized by the southwesterly winds from the ocean, towards the interior the extremes of winter and summer are more marked, and the isotherms trend steadily southward The temperatures at Brest average for the year about 52° F, for January 43° F, and for July 63° F, while at Paris the yearly mean is 50° F, the January average 36° F, and the July average 65° F On the eastern frontier the climate has a continental character, the winters being long and severe and the summers hot Thus, at Nancy, which is nearly in the same latitude as Paris, the annual mean is 48° F, the January mean 32° F., and the July mean 65° F The greatest contrast is exhibited between the bleak climate of the central plateau and the eastern highlands, and the warm, almost subtropical, climate of the Mediterranean coast The prevailing winds for the most of France are from the south and west, and, as the mountains are on the eastern border, the moist winds are not stopped by any obstacle before they reach the highest summit The southerly and westerly winds, being warm and moisture-laden, are responsible for the most of the rainfall A local wind, the "mistral," which descends from the central plateau upon the Mediterranean coast, is remarkable for its constancy and force At Marseilles it blows on an average 175 days in the year, sometimes with such violence as to overturn railway trains and to denude trees of their foliage It has a chilling effect, but by clearing the atmosphere it brings sunshine and healthfulness to the region The rainfall, which averages about 30 inches for the whole country, is greatest along the seacoast, and in the elevated regions of the Cévennes, the Pyrenees, and the Alps, where the annual precipitation usually exceeds 40 inches The smallest average (10 inches) is found in certain interior districts of the northern plains

Flora. The flora of France is typical of that of continental Europe, since plants indigenous to each region may be found in some part of the country Except on the summits of Mounts Cantal and Dore, which were more recently formed than their neighbors, the mountain crests are tipped with species of lichens and mosses peculiar to the Arctic-Alpine regions With lessened altitude appear species in a succession similar to their sequence in decreasing latitude —mustards, crowfoots, dwarf willows, and birches With continued descent the trees, shrubs, and herbs characteristic of northern European forests are met with—pine, spruce, ash, beech, and oak As the level of the sea in

the south of France is approached, species indigenous to that latitude are encountered—chestnut, poplar, mulberry The products of the northern districts and of the higher elevations are wheat, rye, oats, grapes, apples, and pears, of the middle, corn, potatoes, peaches, apricots, cherries, and strawberries, of the southwestern, grapes, prunes, figs, and various nuts, and of the Mediterranean coast, oranges, lemons, olives, and pomegranates See DISTRIBUTION OF PLANTS, ECOLOGY, and the paragraph on *Flora* in EUROPE

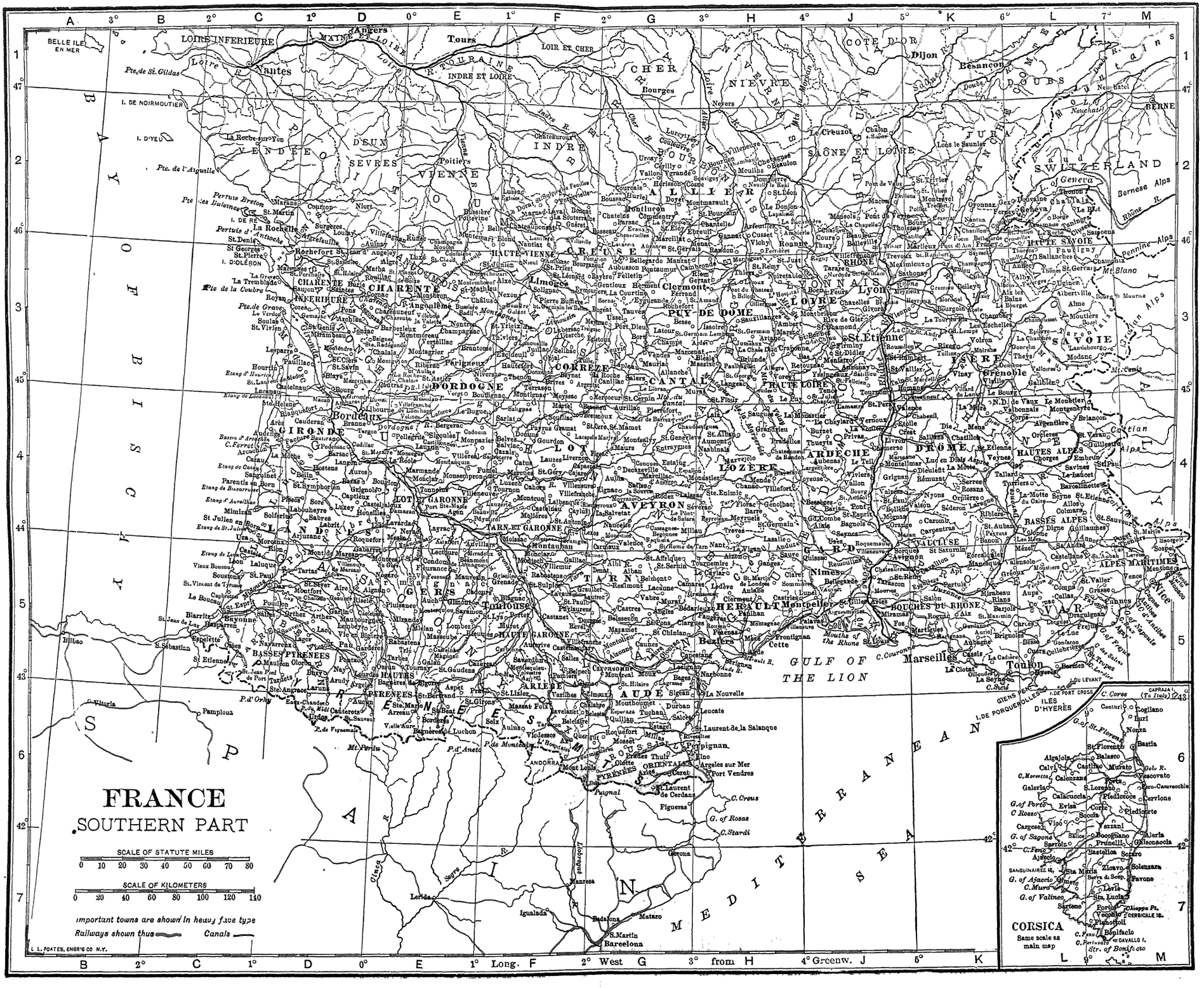
Fauna The fauna of France is representative of western Europe The wide variety of climate and physical features its extensive surface affords gives room and conditions for a great diversity of animal life A sixth or more of its surface is covered with forests, and lofty mountains, broad sandy plains, and a great length of coast offer suitable homes for representatives of the whole fauna of temperate Europe Many large quadrupeds have become extinct or have been reduced to a semidomestic condition during the centuries of human occupation An account of the aboriginal fauna and its partial disappearance is given under EXTINCT ANIMALS Bears still survive in the Pyrenees, and wolves lurk in the forested foothills of the mountains along the Swiss and Italian borders Wildcats are very rare, but a civet (the genet) and foxes are not uncommon, while several weasel-like carnivores occur widely. The higher mountains contain a few chamois, the moufflon remains in Corsica, and the native wild boar and fallow deer are preserved on many private estates The porcupine is the most interesting of the many rodents as a survival near the Mediterranean of ancient forms. The birds embrace a very large list, most of which are common to all Europe Regular routes of migration between northern latitudes and Africa traverse France—one by way of Spain and the Atlantic coast, another across the Mediterranean by way of Sardinia and Corsica, and thence into and beyond France along the valleys of the Rhône, Loire, Saône, and Meuse. Some peculiar southern birds occasionally appear, as the sand grouse, and others are habitually present in the south of France, as the bee eater and hoopoe The great coast line brings all of the wandering sea animals of the north Atlantic to French shores, which are rich in fisheries, oyster banks, and plantations, and littoral life generally The Mediterranean gives a separate sea fauna Among reptiles only the adder, more or less observable everywhere, need be mentioned. Cyprinoids are the most characteristic inland fishes. See EUROPE, DISTRIBUTION OF ANIMALS, and articles upon neighboring countries

Geology. The central plateau is the geological nucleus of France, around which sedimentary strata have been deposited during the Paleozoic and succeeding periods In this region the rocks comprise granites, gneisses, and schists of Archæan character, overlaid in places by later volcanic flows of basalt and trachyte The northern and western plains were built up during Mesozoic and Tertiary times by sedimentary accumulations along certain lines that correspond generally with the present basins of the Seine, the Loire, and the Garonne Normandy and Brittany, however, are of more ancient (Paleozoic) formation and resemble in geological structure the southwestern part of England, with which this portion of France was once united. The bordering highlands were uplifted at different times The Ardennes and the Vosges consist of early Paleozoic strata, with small areas floored by Devonian and Carboniferous, the latter containing the most important coal deposits of the country The Jura Range has lent its name to the Jurassic system, which here includes thick beds of limestones and sandstones that are continued eastward into Germany In the Alps the central granite axis is flanked by Mesozoic strata, upturned and sharply folded The Pyrenees did not assume their present form until late Tertiary times, when there was an extensive upheaval which parted the waters of the Mediterranean and the Atlantic Between the central plateau and the eastern highlands an arm of the sea once extended as far north as the Paris basin, its bed was elevated at the close of the Pliocene and has since been occupied by the basin of the Rhône

Mineral Resources The coal fields of France, while they are limited to the comparatively small area of about 2100 square miles, are the most valuable of the nation's mineral resources. The deposits are distributed over a number of small areas, including those of Pas-de-Calais (which yielded in 1911 about 51 per cent of the total production), Nord (17 per cent), Loire (12 per cent), and Nivernais (Le Creusot), Gard (Alais), Bourbonnais (Commentry), Tarn, and Aveyron They furnish a good quality of bituminous coal, suitable for fuel purposes and to a less extent for iron making Small amounts of anthracite are mined in Isère, and about 700,000 tons of lignite are produced annually, most of it in Bouches-du-Rhône The annual output of coal in France, including the small lignite production, has gradually increased from 4,481,000 metric tons in 1851 to 13,259,000 tons in 1871, 26,025,000 tons in 1891, 32,325,000 tons in 1901, 39,230,000 tons in 1911, and 41,308,000 tons in 1912 The supply is insufficient for domestic consumption, and about 20,000,000 tons are imported annually (about 16,500,000 tons in 1911 and about 23,400,000 tons in 1912) The 1911 output of coal was valued at the mine at 589,219,000 francs, and of lignite at 7,230,000 francs The number of workers was 200,212, whose wages amounted to 292,496,000 francs

The development of manufacturing industries is retarded by lack of fuel and by the high rates of fuel transportation These conditions have necessitated the extended use of water power, with which the country fortunately is well supplied

Iron is next to coal in importance The output of iron ore increased from 1,238,000 metric tons in 1851 to 1,852,000 tons in 1871, 3,589,000 tons in 1891, 4,791,000 in 1901, 8,481,000 tons in 1906, 16,639,000 tons in 1911 (valued at 77,500,000 francs), and 19,160,000 tons in 1912 (92,900,000 francs) Employees numbered 22,674, wages amounted to 36,122,000 francs Of the total output, 15,054,000 tons, or about 90 per cent, were produced in Meurthe-et-Moselle, which is one of the principal iron-producing regions of the world The most important departments producing the remaining 10 per cent are Orne, Calvados, and Pyrénées-Orientales The total output of 16,639,000 metric tons of iron ore in 1911 may be compared with 6,060,000 tons in Luxemburg, 6,154,000 in Sweden, 8,774,000 in Spain, 15,768,000 in the United Kingdom, 23,829,000 in Germany, and 44,600,000 in the United States


FRANCE
SOUTHERN PART
SCALE OF STATUTE MILES
0 10 20 30 40 50 60 70 80
SCALE OF KILOMETERS
0 20 40 60 80 100 120 140
Important towns are shown in heavy face type
Railways shown thus
Canals
L. L. POATES, ENGR'G CO N.Y.
BAY OF BISCAY
GULF OF THE LION
MEDITERRANEAN SEA
SPAIN
SWITZERLAND
CORSICA
Same scale as main map
Long. West from Greenw.

The production of other minerals is comparatively unimportant The total salt output increased from 811,000 metric tons in 1891 to 910,000 tons in 1901, 1,339,000 tons (valued at 18,800,000 francs) in 1911, and 1,099,000 tons (15,900,000 francs) in 1912 Rock and brine salt amounted to 835,000 tons, and sea salt to 504,000 tons, in 1911, of the total, 742,000 tons, or more than half, were produced in Meurthe-et-Moselle, and 210,000 tons in Bouches-du-Rhône In 1911 the output of gold ore was 144,000 tons, valued at 7,583,000 francs, zinc ore, 43,761 tons, 5,159,000 francs, iron pyrites, 278,000 tons, 4,697,000 francs, lead and silver ore, 14,098 tons, 2,613,000 francs, antimony ore, 29,267 tons, 1,597,000 francs Other minerals were of smaller values The total mineral output in 1911 was valued at 717,593,000 francs, exclusive of the output of the quarries

In building materials and quarry products generally France is well endowed In 1911 the value of the product of the quarries, including slate, building stone, cement, etc, amounted to 278,564,000 francs Marble is quarried in the Alps and Pyrenees, granite, sandstones, and limestone, in numerous localities The French millstones, celebrated for their good quality, come from Ardèche. The value of the roofing slates, mostly from the Ardennes, is second only to that of the output of Great Britain Phosphate rock, used in the manufacture of fertilizers, is quarried in the departments of Meuse and Pas-de-Calais Large quantities of this material are mined by French companies in Algeria and shipped to France for manufacture

The mineral springs of France are numerous and of varied character They are situated mostly in the mountain district of Auvergne and in the regions bordering the Alps, Vosges, and Pyrenees Places well known for their baths and medicinal waters are Aix, Aix-les-Bains, Enghien, Bagnères-de-Bigorre, Bagnères-de-Luchon, Bareges, Vichy, Dax, Plombières-les-Bains, Bourbonne-les-Bains, Bourboule, Forges-les-Eaux, and Saint-Sauveur

In the manufacture of iron and steel France is surpassed only by the United States, Germany, and the United Kingdom The output in France has increased notably since about the beginning of the present century In 1880 pig iron was produced to the amount of 1,725,000 metric tons, and worked iron and steel, 1,354,000 metric tons, in 1890, 1,962,000 and 1,407,000, in 1895, 2,004,000 and 1,472,000, in 1900, 2,714,000 and 1,935,000, in 1905, 3,077,000 and 2,112,000; in 1910, 4,038,000 and 2,850,000, in 1911, 4,470,000 and 3,220,000 Not included in these figures is the production of steel ingots, etc, which in 1910 amounted to 3,839,000 and in 1911 to 4,032,000 metric tons Of the pig iron, 3,012,000 tons were produced in Meurthe-et-Moselle, of the worked iron and steel, 973,000 tons in Meurthe-et-Moselle and 861,000 in Nord The value of the pig iron produced in 1911 was 339,136,000 francs, of the worked iron and steel, 556,689,000 francs, of other metals, 99,759,000 francs It is evident that in the production of metals other than iron and steel France is not prominent In 1911 the output included 2726 kilograms of gold (valued at 9,389,000 francs), 47,277 kilograms of silver (5,295,000 francs), lead, 23,635 metric tons (8,925,000 francs); zinc, 57,110 tons (35,192,000 francs), copper, 13,237 tons (19,765,000 francs); nickel, 1880 tons (6,580,000 francs), aluminium, 7400 tons (11,596,000 francs); antimony (regulus and oxide), 4775 tons (2,496,000 francs) Employees in the manufacture of pig iron in 1911 numbered 101,538, worked iron and steel, 82,866, other metals, 5868

Fisheries The fishing industry is on a large scale The following figures are for 1909 and 1910 respectively fishermen, 159,899 and 128,869, sailboats, 29,598, of 196,707 tons, and 28,288, of 206,129 tons, steamers, 269, of 35,807 tons, and 454, of 38,000 tons, value of sailboats, 56,843,000 and 51,933,000 francs, value of steamers, 27,716,000 and 23,945,000 francs, value of the catch, 134,866,000 and 140,288,000 francs In 1910 the catch of cod amounted to 75,542 metric tons, valued at 31,915,000 francs (of which 63,890 tons, 25,222,000 francs, on the Newfoundland Banks), sardines, 26,390 tons, 13,397,000 francs, herrings, 45,949 tons, 11,269,000 francs, mackerel, 14,046 tons, 7,018,000 francs, tunny and dolphin, 8201 tons, 5,518,000 francs, lobster and sea crayfish, 1408 tons, 3,435,000 francs, oysters, 779,000 francs

Agriculture Its geographical position, fertile soil, and mild climate combine to make France an agricultural country Agriculture has been the chief occupation of its inhabitants for centuries, and the French peasant and landlord have been distinguished for their quickness in adopting improved methods of cultivation following the discoveries of science The total active population in 1906 was returned at 20,720,879, of whom 8,777,053 were engaged in agriculture The most fertile sections of the country are in the north and northeast and along the valleys of the Garonne and Rhône The least productive are the marshy *landes* of the southwest and the mountain regions of the Pyrenees and Alps The cultivation of cereals, wine production, and cattle raising are the principal branches of agriculture In 1911, out of a total of 52,920,208 hectares, as reported, 23,752,240 hectares were under the so-called great crops and in sown meadow and fallow, 4,905,670 in natural meadow, 1,526,560 under forage grasses, 3,664,380 in pasture, 1,664,880 under vines, 1,083,990 in market gardens, shrubberies, etc, 9,339,319 in forest, 3,885,220 uncultivated, and 2,861,069 in various uses not included in the foregoing

Cereals—In 1912, upward of 13,600,000 hectares, or more than one-fourth of the total area of the country, were under cereals, in the production of which France stands, among European countries, second only to Russia Nearly one-half of the cereal area is devoted annually to the production of wheat In some European countries the trend of the population cityward, American and Canadian competition, and other causes have combined to curtail wheat cultivation; but this condition is barely noticeable in France In 1871, 6,423,000 hectares were under wheat, in 1901, 6,794,000, in 1913, 6,543,550 Under oats in 1871 were 3,397,000 hectares, in 1901, 3,856,000, in 1913, 3,998,820 Wheat is largely raised in the north, in the west, in the central parts, and in the basin of the Garonne Previous to 1860 rye bread was the staple food of the peasantry, but after that time they began to discard rye for wheat, so that the people now, though consuming much rye, are pre-eminently a nation of wheat eaters

Next to wheat in importance is oats, to which 3,397,000 hectares were planted in 1871, 3,856,000 in 1901, and 3,982,000 in 1912, more than one-fourth of the cereal area being devoted to this crop. In the area under oats France ranks

third in Europe, being exceeded by Russia and slightly by Germany

The table below shows area and production of cereal crops in 1911 and 1912, with metric quintals produced per hectare in 1912

	Hectares		Quintals		Qs per ha
	1911	1912	1911	1912	
Wheat	6,443,360	6,571,580	87,727,100	90,991 500	13 84
Meslin	127,270	128,750	1,541,220	1,554 620	12 07
Rye	1,174,420	1,201,630	11,875 000	12,382,200	11 05
Barley	771,935	759,630	10,856,570	11,014,200	14 49
Buckw't	460,940	461,230	2,160,190	5,006,940	10 85
Oats	3,991,490	3,981,980	50,693,500	51,541,600	12 94
Corn	404,550	476,480	4,282,700	6,028,680	12 65
Millet	21,435	21,170	125,010	154,555	7 30

Fruit and Vine Growing—France is famous for her fruit and especially for the product of her vineyards Apples, plums, pears, peaches, and cherries abound in the north and central parts of the country, while the orange, lemon, and olive thrive in the south Nuts also grow in great abundance The most important of the nuts is the chestnut, the annual value of which is the largest single item in the revenue of the French nut growers It grows on the poorer lands of the country and in the mountainous regions of Auvergne and Corsica and constitutes a staple food of the inhabitants The vine has from a very early period constituted one of the principal sources of the agricultural wealth of France The mild climate and the soil of the country are especially adapted to its cultivation The choicest grapes are grown in Champagne, Burgundy, and the region of Bordeaux, but some excellent kinds are produced on the banks of the Loire and in some of the southern departments The area devoted to this culture increased from 2,003,000 hectares in 1830 to 2,429,000 in 1872 and 1873, and then decreased to 1,609,000 hectares in 1900, 1,618,000 in 1910, and 1,551,000 in 1912 The vine culture has from time to time received serious checks through attacks by the fungus known as the *oidium*, which inflicted such serious damage that in 1854, the worst year, the hectare yielded only 4 97 hectoliters Another destructive disease is caused by the ravages of an insect known as *Phylloxera vastatrix*

The damage wrought by these diseases is shown by the fact that the average yield per hectare, which rose to 20 75 hectoliters in 1850, began to decline after that year It advanced to 24 69 hectoliters in 1858, 35 in 1875, 37.11 in 1901, 40 in 1907, and 37 in 1908, but these were exceptionally good years. In 1878 the French government took the first step to combat the evil By a series of legislative enactments calculated to encourage a war of extermination against the insect, the government finally succeeded to a great extent in overcoming the pest The most effective means of overcoming the ravages of phylloxera was the importation of American vine stock upon which the French vines were grafted. The following figures illustrate the progress of the wine industry in the nineteenth century and during the opening years of the twentieth century In 1829 there were produced 31,000,000 hectoliters, in 1849, 35,600,000, in 1880, 29,700,000, in 1890, 27,400,000, in 1900, 67,400,000, in 1905, 56,700,000, in 1910, 28,500,000; in 1912, 59,400,000 The production of cider in 1904 was 41,000,000 hectoliters, and in 1905 only 4,800,000, in 1910, 12,300,000, and in 1912, 17,700,000

Live Stock—Stock raising is of secondary importance in France, domestic stock being far from sufficient to meet the home demand There were 14,706,000 cattle in 1912, as compared with 14,521,000 in 1900 and 13,633,000 in 1890 The cattle in 1912 included 7,745,750 cows, 2,842,710 young stock, 1,844,790 steers, 283,670 bulls, and 1,988,980 calves The dairy industry flourishes, especially in the north, where the products are exported to England Horses are raised principally in the north and west The raising of fine breeds is an object of special care on the part of the government in the interest of the army The number of horses has been nearly stationary since 1862, in that year there were on farms 2,914,000, in 1880, 2,849,000, in 1900, 2,903,000, in 1912, 3,222,000 Sheep breeding is important However, in spite of the efforts of the wool growers, the number of sheep declined from over 32,000,000 in 1842 to 29,500,000 in 1862, 23,800,000 in 1882, 20,200,000 in 1900, 17,954,230 in 1903, and 16,467,700 in 1912, a decline which had to be covered by importations The number of hogs, which increased to 7,421,000 in 1892, declined to 6,740,000 in 1900 and 6,903,750 in 1912 The best breeds are raised in Champagne and the Pyrenees Importation is necessary to meet the home demand Goats, mules, and asses are among the animals of the French peasant In 1912 there were 1,408,520 goats, 358,660 asses, and 196,410 mules Apiculture is well developed

Industrial Plants—Beets owe their importance to the manufacture of beet sugar, which originated during the early part of the nineteenth century During the prevalence of the vine disease, beets were employed in the manufacture of alcohol The cultivation is carried on chiefly in the north and east, the area was 255,170 hectares in 1912, and the production 72,221,045 metric quintals Hemp and flax are grown chiefly in the north The cultivation of the mulberry tree for silk production was introduced in the reign of Henry IV (1589–1610). This industry receives assistance from the government and is carried on chiefly in Drôme, Gard, Ardèche, Hérault, and Vaucluse Notwithstanding the large premiums, however, the number of sericulturists is decreasing In 1903, 120,266 persons were engaged in silk culture, and, in 1912, 99,360 For years after 1860 the production increased, though it has always fallen far short of 1850, when 25,000,000 kilograms of cocoons were produced The average of the last decade of the nineteenth century was 8,000,000 kilograms of cocoons, or 2,000,000 kilograms of raw silk In 1903 the production of cocoons had declined to 5,985,481 kilograms and in 1910 to 4,269,790, in 1912 it rose to 6,233,942, but in 1913 dropped again to 4,417,426 Of the other industrial plants, tobacco and colza are the most important Potatoes and mangold are important crops, as also are beets (other than sugar beets) Tobacco production, manufacture, and sale are a government monopoly and a source of large revenue Production restricted to 25 departments is controlled by the state In 1912 there were 1,563,530 hectares planted to potatoes, yielding 150,251,530 metric quintals

Land Tenure—France is a country of small farms, the inheritance laws having contributed to the extreme parcellation of the agricultural land. According to the latest available esti-

mates there are about 3,000,000 holders of farms below 25 acres, while those whose farms are not larger than 2½ acres exceed 1,000,000 in number About 20 per cent of the cultivated area is in farms under 25 acres, and nearly one-half the cultivated or pastured area is in farms of less than 100 acres There are, however, many large estates, recent estimates indicating that farms or estates of over 400 acres occupy more than one-fourth of the area About 80 per cent of the holdings are occupied or cultivated by the owners Of the 53,000,000 hectares of land in France about 25,000,000 were, in 1910, under great crops and sown meadows, 5,000,000 natural meadows, 5,000,000 pasture and forage grasses, 1,500,000 in vineyards, and nearly 10,000,000 in forests Market gardening is an important agricultural industry in the vicinity of Paris, and the market gardeners have a high reputation for their skill in this line

Beet Sugar —About 6,000,000 acres of land in France are devoted to the production of sugar beets, and the quantity of sugar produced is about 600,000 metric tons annually. France holds fourth rank among the countries of the world in the production of beet sugar, being exceeded by Germany, Russia, and Austria-Hungary The chief production is in the northern part of the country The number of men engaged in the sugar industry is about 35,000

Forests —The principal forest trees are the chestnut and beech in central France, the oak and cork tree in the Pyrenees, and the fir in the Landes The pinaster is extensively cultivated along the southwestern coast on account of its usefulness in reclaiming the low seacoast and because of its rich yield of turpentine The destruction of the national forests has been enormous within the last two centuries, but measures were taken as early as 1827, and especially in recent years, to plant new woods in order to protect those mountain slopes which are exposed to inundations from Alpine torrents The forests of France embraced, in 1911, 9,339,-319 hectares, slightly more than one-sixth of the total area of the country. Nearly two-thirds of the area under forests is in private hands, while one-third is in the hands of the national, departmental, and communal governments

Agricultural Education —The betterment of agricultural conditions in France is elaborately provided for by the National Department of Agriculture This department has established under one central authority a much more comprehensive and closely coordinated system of agricultural education than is known in America The schools are adapted to local needs Not only is instruction in agriculture a branch of the general course in the public schools, but there are practical schools of apprenticeship especially for the training of the peasant laboring class A professor of agriculture is assigned to each department, and conferences are given in the important agricultural communities

Manufactures For centuries France held a preeminent position as a manufacturing country The fame of French industry was due to the skill of her craftsmen, which was developed through generations But with the advent of modern industrial appliances, the conditions for the success of which are not so much technical skill as an abundant supply of raw material, especially coal and iron, France was at a disadvantage Not possessing the natural resources which insure cheap power and industrial operations on a large scale, the country has been handicapped in the international contest for the world's markets, though in recent years the use of electricity generated from water power has proven of material assistance to her industries The manufactures which are most successfully produced are largely confined to those industries or branches of industries whose products are noted for their superior artistic finish, and they do not directly compete with British, American, or German manufactures in the world's trade The more important industries are the textile, metal, paper, chemical, glass and pottery industries Several other branches of French manufacture are famous for the elegance and beauty of their products, but they are of minor importance from the point of view of net financial returns Such are the glove industry of Grenoble and Paris, the Gobelin tapestry, costly shawls, watches, clocks, articles of virtu, carriages, scientific instruments (manufactured mostly in Paris), the matchless china and glass of Sèvres, the fine furniture of Paris and Bordeaux, and many other articles of comfort and luxury The textile industry is by far the most important, the annual output being valued at about $750,000,000 This includes woolen, cotton, silk, and linen manufactures, enumerated in the order of the value of their products The woolen industry employed in 1906 171,000 people in more than 2000 mills, turning out about $260,000,000 worth of goods per annum It is carried on chiefly in the departments of Nord, Ardèche, Marne, Somme, Aisne, and Tarn The more costly of the products of the industry, such as the Paris and Lyons shawls, the Rouen, Roubaix, and Sedan cloths, are in demand all over the world While exporting enormous quantities of woolen goods, France has to import a good deal of raw wool, owing to the decline of the domestic output The cotton industry, centring chiefly in the departments of Nord, Vosges, Eure, Aube, and Seine-Inférieure, employed about 150,000 persons at 5,200,000 spindles and 95,000 looms in 1900, as compared with about 100,000 persons and 4,376,000 spindles in 1890, in 1906, 167,000 persons were employed, and the number of spindles rose to 7,400,000 in 1912 The industry dates in France from 1773 Its annual output is valued at over $120,000,000 The silk industry, while ranking third in the value of its output, excels in the artistic finish of its products The annual value of these is estimated at about $110,000,000 for Lyons and Saint-Etienne alone This industry employed about 124,000 persons in 1906 Hand-loom weaving is rapidly declining, the chief seat of this house industry is in the Department of Rhône In the production of linen goods France leads in the matter of style, quality, and design The linen industry flourishes chiefly in the north, the names of Lille, Cambrai, and Valenciennes having become identified everywhere with the finest qualities of linen No less famous are the lace manufactures of Paris, Saint-Etienne, Lyons, and Nantes

The metal industry is next in importance While there are large iron and steel mills in the mining region, the departments of Nord, Meurthe-et-Moselle, Loire, and Pas-de-Calais, France is far behind such countries as the United States, Great Britain, and Germany in that field and has to resort largely to imports

of machinery It is known, however, for the fine qualities of its smaller metal ware, such as safes, hardware, steel pens, locks, files, needles, etc The excellence of French gold and silver ware is a matter of common knowledge The manufacture of jewelry, watches, and optical instruments deserves mention At the opening of the twentieth century the paper industry engaged about 40,000 people in 600 paper mills, producing some $60,000 000 worth of goods annually In 1885 the number of mills barely exceeded 500 employing about 30,000 workmen and turning out products valued at but $23,000,000 The manufacture of pottery furnished employment to some 166,831 people in 1906 In addition to the superb china and porcelain ware of Sèvres there should be mentioned the famous mirror works of Saint-Gobain and Montluçon, and the imitation jewels and glass prisms The chemical industry ranks probably next to that of Germany, the more important branches from a commercial point of view being the manufacture of perfumes, soap, and candles Beer brewing is increasing in importance, the consumption of beer growing at the expense of wine, especially by the poorer classes From about 8,227,000 hectoliters in 1880, the production of beer rose to over 10,712,000 hectoliters in 1900, 12,239,000 in 1910, and 14,650,000 in 1911 The production of wine has kept pace with vine growing, and French cognac still leads the world In 1899–1900 there were produced 869,201 metric tons of refined sugar, this increased to 1,051,931 tons in 1901–02, but declined to 562,736 tons in 1904–05, the production in 1905–06 was 984,672 tons, in 1910–11, 650,488, in 1911–12, 465,378, and in 1912–13, 877,656. In 1905, 2,608,626 hectoliters of alcohol were produced, and, in 1912, 3,309,609 hectoliters The growth of large modern industries may be best seen from the increased use of steam power, e g, in 1840 the engines and motors employed in the industrial establishments of France, not counting the railways, numbered 2591, with 33,000 horse power, in 1890 the horse power exceeded 863,000, in 1900, 1,791,000, in 1910, 2,913,000, and, in 1912, 3,225,000, the total number of engines in the latter year being 81,675

Transportation. In length of railway, France is fifth among the countries of the world The table below compares the length of the French railways, in kilometers, with that of other leading countries at the end of 1890 and at the end of 1911, the table shows also the number of kilometers for each 100 square kilometers of territory and for each 10,000 inhabitants (the kilometer equals 0 62137 mile)

Country	Kilometers		Km per 100 sq km		Km per 10,000 pop	
	1890	1911	1890	1911	1890	1911
United States	268,409	396,860	3 0	4 3	42 7	43 1
Germany	42,869	61,936	7 9	11 4	8 7	9 5
Russia*	30,957	61,078	0 6	1 1	3 2	4 8
British India	27,000	52,838	0 6	1 0	0 9	2 8
France	36,895	50,232	7 0	9 3	9 6	12 8
Austria-Hungary	27,113	44,820	4 0	6 6	6 2	8 8
Canada†	22,533	40,869	0 3	0 5	46 7	62 9
United Kingdom	32,297	37,649	10 3	12 0	8 5	8 3
Argentina	9,800	31,575	0 4	1 1	24 1	64 5

* European Russia, including Finland. † At end of fiscal year

The average length of railway in exploitation in France during 1911 was 49,980 kilometers (31,056 miles), of which 40,635 kilometers were comprised in the lines of general interest and 9345 kilometers in the lines of local interest The average length of railway of general interest in operation in 1841 was 499 kilometers, in 1850, 2915, in 1860, 9167, in 1870, 15,544, in 1880, 23,089, in 1890, 33,280, in 1900, 38,109, in 1905, 39,607, in 1910, 40,484, in 1911, 40,635, in 1912, 40,854 (provisional) The average length of railway lines of local interest in operation in 1880 was 2105 kilometers, in 1890, 3015, in 1900, 4575, in 1905, 6868, in 1910, 8714, in 1911, 9385 (provisional), in 1912, 9925 From the foregoing figures it may be seen that the combined average length of railway in operation increased from 25,194 kilometers (15,655 miles) in 1880 to 36,295 in 1890, 42,684 in 1900, 49,198 in 1910, and 50,779 (31,553 miles) in 1912

The average length of railway in operation in 1910 was comprised as follows· I The great systems State lines, 8925 kilometers (including 2967 in the old system and 5958 in the Western Railway system, which was transferred to the state Jan 1, 1909), the lines of the great companies, comprising the Northern Railway system, 3803 kilometers, Eastern Railway system, 4939, Paris-Orléans system, 7744, Paris-Lyons-Mediterranean Railway system, 9562, Southern Railway system (Midi), 3892, other, 158, total, 30,098 kilometers II Secondary systems, 1461 kilometers Total railway of general interest, 40,484 kilometers III Railway of local interest, 8714 kilometers Grand total, 49,198 kilometers In addition there were tramways aggregating 5895 kilometers and the Paris-Metropolitan of 59 kilometers.

The great railway systems, with one exception, converge upon Paris, these systems are six in number, excluding the old state lines and including the Western system, now taken over by the state A thorough grasp of these is essential to a clear understanding of the principal economic divisions of the country and their effect upon its industrial and commercial development These lines, as mentioned above, are the Northern, the Eastern, the Paris-Lyons-Mediterranean, the Southern, the Paris-Orléans, and the Western

The most important is the Paris-Lyons-Mediterranean Railway, running, with its numerous branches, through the richest section of France and connecting the two largest cities of the country, Paris and Marseilles It commands the traffic of the Rhône valley as well as that going to and from Switzerland, Italy, and southern Germany Its paid-up capital at the end of 1910 was 4,831,273,328 francs

The Paris-Orléans Railway extends beyond Orléans to the west and south through Tours to the ports of Nantes and Bordeaux and has its southern terminal at Toulouse, where it joins the Southern Railway. It passes through a rich agricultural country, serving as an outlet for its products, which it takes to the Atlantic ports just mentioned, to the Mediterranean through the Southern Railway, and to Paris and the northern region of France. Its paid-up capital at the end of 1910 was 2,549,191,025 francs The Southern Railway is the only trunk road that does not terminate in Paris. It traverses the south of France from east to west, joining the two roads just described The principal

terminals of the line are Bordeaux, on the Atlantic, and Cette on the Mediterranean At the latter point it joins the Paris-Lyons-Mediterranean line and connects at Perpignan and Bayonne with the railways of Spain Its paid-up capital at the end of 1910 was 1,392,517,683 francs The Northern Railway, extending from Paris northeast to the Belgian frontier and northwest to the ports situated on the English Channel, passes through the richest mining region of France It handles the traffic with England and northern Europe and has terminals in the ports of Dunkirk, Calais, and Boulogne, besides passing through the important textile centres of Lille, Cambrai, Valenciennes, Arras, etc Its paid-up capital at the end of 1910 was 1,762,069,513 francs

The Eastern Railway covers the territory lying between the Northern and the Paris-Lyons-Mediterranean systems It is of great strategic value, since it extends directly east of Paris towards the German frontier Though not connecting the same terminals, it competes with the two systems mentioned above, since it carries traffic to Belgium and northern Germany over Mézieres, to Switzerland over Belfort, and to southern Germany over Nancy Its paid-up capital at the end of 1910 was 2,153,885,723 francs Finally, the Western Railway (taken over by the state in 1909), extending from Paris over the northwestern and western parts of France, terminates in a number of ports on the English Channel and the Atlantic, notably Dieppe, Havre, Cherbourg, Saint-Malo, and Brest It is in a position to compete with the two adjoining roads—the Northern on the northeast and the Paris-Orléans on the southwest Its paid-up capital at the end of 1910 was 2,088,113,534 francs The state railways, exclusive of the Western, cannot be said to form a system, since they are not all contiguous, but form an irregular, broken net, intersecting at many points the other roads. The great railways of France will thus be seen to cover each a distinct territory, distinct both in the sense that each territory is traversed by one system only and that each forms a distinct economic entity The Northern Railway may be called a coal-carrying line, the Paris-Lyons-Mediterranean a carrier of finished products, and the Paris-Orléans a grain carrier

The operation of government and private railways side by side is the result of a long series of experiments Since 1842, when the first law regulating the construction and operation of railways went into effect, the country has passed through a number of stages, each having its effect on the railways The present status is the result of the Law of 1883, which left the principal lines in private hands, but under strict government control, and of the laws of 1908 whereby the Western was taken over by the state According to the charters of the railways, their franchises expire between 1950 and 1960, when the entire railway property will pass to the state without any compensation The government, in 1883, turned over nearly all the lines to private companies without any compensation. New construction is done by the government, the companies being assessed for the purpose 25,000 francs per kilometer, a little over $8000 per mile, about one-tenth of the actual cost For the remainder the companies advance the money to the government, which the latter pays out in annuities at a certain rate of interest, after deducting the amounts due to it for sums advanced to the railways for the payment of dividends The state guarantees a minimum dividend to the stockholders In the event of inability of a road to declare the minimum dividend on the capital stock, the state advances the required sum, which, with the accrued interest, goes to make up the debt of the road to the state, payable from the profits of succeeding years When the profits exceed a certain rate, the government receives two-thirds of the surplus In 1911 the total receipts of the roads of general interest was 1,901,088,000 francs, expenses, 1,188,404,000, net receipts, 712,684,000

Roads The French highroads have world-wide fame The laying of the first is attributed to Philip Augustus, and their more perfect organization during the sixteenth and seventeenth centuries was due to Henry IV and Louis XIV These roads are divided into three kinds—national, departmental, and communal The national roads in 1911 had a length of 38,239 kilometers

Commerce The general commercial policy of the French government was that of protection during the entire nineteenth, and has continued to be protective in the twentieth century The unfortunate condition in which France found herself after the War of 1870–71 demanded higher tariff duties for fiscal purposes, but owing to existing treaties with other countries, they could not be introduced before 1882, when a new general tariff was adopted, raising the duties about 25 per cent Treaties for a term of 10 years terminating in 1892 were entered into with most of the European countries, of which Germany, Russia, Turkey, and Rumania enjoyed the privilege of the "most favored nation" clause Subsequent changes in the tariff have been designed to make it more prohibitive The development of the French foreign trade is shown in the table below, in millions of francs, the table shows the general commerce and the special commerce, and the special commerce is discriminated into the three great classes of food products, raw materials, and manufactured goods, bullion and specie are not included, postal packets are included with manufactured goods

Both imports and exports have shown a substantial increase, although the tariff crippled the import trade for many years subsequent to 1880 The exports during these years would have increased more rapidly had it not been for the retaliatory commercial restrictions imposed by other countries The dependence of France upon foreign countries for her supply of raw material (including coal) is shown by the fact that in 1912 this constituted about 58 5 per cent of the total imports, while manufactured products amounted to only 19 6 per cent As explained above under *Manufactures*, because of the different nature of the products, France does not compete with Great Britain, the United States, and Germany in the world's trade, where the demand is largely for cheap machine-made goods As France sells a large proportion of expensive goods, and buys great quantities of cheap, bulky raw materials, vessels in the French trade often find it difficult to get full return cargoes from French ports.

The chief articles of import in the special trade in order of their importance in 1911 were as follows (values in millions of francs)

cereals, 715 1, wool, 628 2, cotton, 558 7, coal, 453 5, oil seeds, 371 7, hides and skins, 355 0, silk, 317 4, wine, 301 5, machinery, 286 7, rubber, 237 8, timber, etc, 193 3, coffee, 144 4, copper, 143 3, ores, 113 4 flax, 85 9, jewelry, 82 4, petroleum, 81 4, butter and cheese, 81 1, metal wares, 77 4, pottery and glass, 76 7, nitrate of soda, 76 3, paper, 74 8 The leading articles of export in the special trade in 1911 hides and skins, 349 3, cotton tissues, 334 2, wool, 323 6, silk tissues, 292 0, lingerie, 197 7, woolen tissues, 190 6, wine, 187 7, *articles de Paris*, 183 4, chemical products, 169 6, automobiles, 162 4, silk, 162 4, rubber, 156 9, cotton, 120 3, paper, 119 8, machinery, 113 6, metal wares, 106 7, novelties, 87 2, pottery and glass, 83 3, woolen yarn, 75 2, leather goods, 75 0, oils, 73 9, jewelry, 72 6, rubber goods, 71 0, table fruits, 69 2, butter and cheese, 66 2, sugar, 64 4, timber, etc, 62 5, plumes, 59 6, iron and steel, 59 4 Import and export of coin and bullion in 1909, 540 0 and 361 0, in 1910, 406 0 and 390 0 in 1911, 462 0 and 285 0

YEARS	General commerce		Special commerce							
	Imports	Exports	Imports				Exports			
			Food	Raw	Mfd	Total	Food	Raw	Mfd	Total
1830	638 0	573 0	153 5	303 4	32 3	489 2	119 5		333 4	452 9
1840	1,052 0	1,011 0	190 6	506 9	49 9	747 4	184 4		510 6	695 0
1850	1,120 0	1,435 0	131 4	618 5	40 8	790 7	321 9		746 2	1,068 1
1860	2,657 0	3,148 0	395 3	1,443 1	58 9	1,897 3	848 5		1,428 5	2,277 1
1870	3,498 0	3,456 0	802 2	1,766 6	288 6	2,867 4	1,376 9		1,425 2	2,802 1
1871	3,953 0	3,278 0	1,157 0	2,035 1	374 7	3,566 7	1,328 0		1,544 5	2,872 5
1880	6,113 0	4,612 3	1,961 6	2,472 4	599 2	5,033 2	811 2	916 8	1,839 9	3,467 9
1890	5,452 4	4,840 2	1,445 1	2,372 9	618 9	4,436 9	855 4	897 4	2,000 6	3,753 3
1895	4,919 6	4,589 3	1,035 5	2,100 9	583 5	3,719 9	591 0	873 6	1,909 2	3,373 3
1900	5,988 6	5,521 6	819 2	3,035 3	843 3	4,697 8	769 2	1,084 8	2,254 7	4,108 7
1905	6,061 5	6,302 3	822 9	3,087 3	868 7	4,778 9	780 5	1,338 0	2,748 4	4,866 9
1909	7,856 5	7,482 3	952 3	4,113 1	1,180 7	6,246 1	823 6	1,693 8	3,200 7	5,718 1
1910	9,102 6	8,104 9	1,413 0	4,345 7	1,414 6	7,173 3	858 2	1,930 8	3,444 8	6,233 8
1911	9,809 9	8,012 2	2,020 0	4,525 3	1,520 5	8,065 8	736 9	1,830 1	3,509 9	6,076 9
1912	10,293 6	8,823 9	1,803 4	4,381 2	1,614 2	8,230 8	849 8	1,944 9	3,917 9	6,712 6

The course of trade between the United States and France in the last 30 years may be traced in the following table

YEAR	Imports into the U S from France	Exports from the U S to France
1875	$36,708,600	$51,029,200
1891	76,688,995	60,693,190
1895	61,580,509	45,149,137
1899	62,146,056	60,596,899
1900	73,012,085	83,335,097
1903	90,050,172	77,285,239
1905	89,830,445	76,337,471
1907	127,803,407	113,604,692
1909	108,387,337	108,764,262
1911	115,414,784	135,271,648
1913	136,877,990	146,100,201
1914	141,446,252	159,818,924

In 1911 imports of merchandise from, and exports of merchandise to, foreign countries were valued at 7,136,774,000 and 5,201,071,000 francs respectively, free zones, etc, 29,152,000 and 77.971,000, French colonies and protectorates (including Algeria), 899,902,000 and 797,817,000, totals, 8,065,828,000 and 6,076,859,000 In 1911 imports of merchandise from, and exports of merchandise to, the United Kingdom were valued at 994 2 and 1219 9 million francs respectively (special trade), Germany, 979 7 and 794 6, United States, 826.8 and 379 7 Belgium, 542 6 and 1024 2, Russia, 443 1 and 53 9, Algeria, 425 6 and 489 9, British India, 360 2 and 42 7, Argentina, 353 8 and 170 4, Spain, 230 5 and 135 6, China, 229 8 and 13 7, Italy, 190 3 and 277 8, Rumania, 175 1 and 10 7, Brazil, 146 0 and 78 5, Switzerland, 140 2 and 394 0

Shipping and Navigation The French merchant marine increased from 15,585 vessels, of 1,037,726 tons net, with 91,506 men, at the end of 1900, to 17,729 vessels, of 1,462,639 tons net, with 98,226 men, at the end of 1911 At the latter date there were 15,949 sailing vessels, of 624,521 tons, and 1780 steamers, of 838,118 tons, of the total, 15,064 vessels, of 107,188 tons, were under 30 tons each In 1911 there entered at French ports, in the foreign trade and the deep-sea fishing, 30,615 vessels, of 30,483,408 tons (of which, 8046 vessels, of 7,266,870 tons, French), and cleared 31,013 vessels, of 30,882,743 tons (8244, of 7,478,433 tons, French) In combined tonnage, entered and cleared, the principal ports ranked as follows in 1911 Marseilles, Havre, Cherbourg, Bordeaux, Boulogne, Dunkirk, Rouen, Cette, La Rochelle, Saint-Nazaire, Nantes, Calais The merchant marine receives an annual government subsidy of about $5,000,000 An important means of inland transportation is afforded by river and canal Principal water lines in 1911 totaled 6036 kilometers, and secondary lines 5318 kilometers, there was steam navigation on 2563 kilometers of canal and 2542 kilometers of river

Weights, Measures, and Money The metric system is the only one used throughout the country and its dependencies There is theoretically a double monetary standard, silver being given an arbitrary value in proportion of 15½ to 1 of gold But practically the standard of value is gold, there is no free and unlimited coinage of silver By the agreement of the Latin Monetary Union, which embraces besides France the countries of Belgium, Italy, Switzerland, and Greece, the coinage of silver in each of these countries is limited For France the Convention of 1897 authorized an issue of 394,000,000 francs The monetary unit is the franc, usually regarded as equal to 19 3 cents in United States money, the par value is 19 295 cents The franc has 100 centimes The coins in use are the 10 and 20 franc gold coins, the silver coins of 1, 2, and 5 francs and of 20 and 50 centimes; and the bronze 5 and 10 centime coins

Banking The French banking system has in many respects served as a model for other nations Of late years banking and financing operations generally have acquired a greater relative importance in the economic activity of the country than before, since through that channel the surplus capital of French citizens is directed into productive fields in foreign countries With the exception perhaps of England, France holds the leading position in the world for the amount of foreign investments There are two distinct classes of financial institutions to be considered here (1) the Bank of France, which stands by itself and (2) other banking institutions The Banque de France is a private institution, managed under strict government control, owing to the important government functions intrusted to it This control is exercised not only by general legislative provisions, such as govern all other banks, but also directly through the governor and undergovernors of the bank, who are appointed by the government The governor can exert a veto power over the actions of the bank by refusing to sign the decisions of the General Council, which represents the stockholders In addition to its general banking function, such as receiving and lending money and keeping accounts with private individuals, the bank conducts all the money operations of the public Treasury and has the sole power of issuing paper money It was founded in 1800 and was reorganized upon a firmer basis in 1806, it passed through many changes, following the stormy events of the nineteenth century Its present form of organization and basis of operation date from the charter of 1857, renewed in 1897 and expiring in 1920 The maximum issue of paper money is limited to 5,000,000,000 francs The state regulates, through the veto power of the governor, the ratio of metallic reserve to the notes in circulation In return for the privilege of the exclusive power of note issue and of being the depository of all the public funds, the bank performs gratis all the fiscal services in connection with the keeping, transferring, and disbursing moneys on behalf of the Treasury In addition to that it keeps open to the state at all times a credit of 180,000,000 francs, free of interest or any other charges In addition to all taxes to which other banks are subject, it pays a stamp tax on the note circulation On Jan. 2, 1914, the principal resources and liabilities of the bank were as follows Cash, 4,146,261,059 francs of which 3,507,000 000 were gold, and 640,000,000 silver, portfolio, 1,980,667,000 francs, advances, 1,001,829,000 francs, capital and reserves, 256,000,000 francs, notes in circulation, 6,034,624,735 francs, accounts current (deposits), 692,612,354 francs

The other principal banking institutions are the Crédit Foncier, capital stock, on Jan. 1, 1908, of 200,000,000 francs, Crédit Lyonnais, 250,000,000 francs, Banque de Paris et de Pays-Bas, 75,000,000 francs, and a number of banks with a capital of less than 75,000,000 francs The Paris Clearing House (La Chambre de Compensation des Banquiers), unlike the New York or London houses, plays an insignificant rôle It was founded in 1872 after the London model and, although much had been expected of it, has not proved a success, owing to the reluctance of the French people to use checks The use of checks is limited to very large transactions and even in those cases is not always the rule Savings banks thrive and flourish in France in great numbers The first savings bank was established in Paris in 1818, in 1840 there were 430 such institutions, with deposits exceeding $38,000,000, and on Jan 1, 1913, the private savings banks held deposits exceeding the sum of $754,000,000, credited to 8,391,000 depositors In addition to that 5,971,000 depositors had $329,000,000 in the government postal savings banks The latter were founded in 1881.

Finance The characteristic features of French finance are the largest public debt of any nation in the world, great and rapidly growing expenditures, and heavy taxation, which nevertheless frequently leaves a large deficit, leading to fresh borrowings

Revenue—The revenues of the Republic are derived from two sources, taxation and state properties and monopolies The financial system resembles more that of the United States, differing greatly from those of the United Kingdom and Germany in the great preponderance of indirect over direct taxes Only about one-fifth of the revenue derived from taxation comes from direct taxes, and four-fifths from indirect The revenue derived in France from all kinds of taxes constitutes nearly 70 per cent of the total, the remainder being the income from government properties, monopolies, etc The more important of the direct taxes are those on real estate, personalty, doors and windows, property in mortmain, and the royalties from mines, trade licenses, and such objects of personal use as carriages, horses, bicycles, etc. Among the indirect taxes the most important are the registration tax, contributing nearly one-third of the total revenue from indirect taxes, customs duties, yielding nearly one-fourth, the tax on sugar, nearly one-fourteenth, stamps, with over one-tenth of the total indirect revenue, and a large number of excise duties on various articles of consumption, such as liquors and wines, salt, candles, vinegar, the tax on railway tickets, etc When we bear in mind that the incomes from a number of the state monopolies are practically indirect taxes, as, e g, in the case of tobacco and matches, it becomes apparent that the French consumer is heavily taxed on nearly everything he eats, drinks, wears, and enjoys, the department and common taxes cover nearly everything that the national government omits The most important revenues from government monopolies, in addition to those mentioned, are those derived from state railways, the operation of the mint, public domain and forests The 1913 budget showed estimated receipts as follows direct taxes, 622,334,030 francs, indirect taxes, 2,548,755,235, state domains and forests, 67,971,480, state monopolies and industrial enterprises, 968,655,373; various, 428,585,780, total, 4,736,882,438

Expenditure—The chief item of expenditure is the service of the public debt, which absorbs more than one-fourth of the total revenue of the government The next largest item is for the Ministry of War, over one-fifth of the total, the Marine follows next, with an expenditure nearly one-half as large, after which come the Ministry of Public Works and the Ministry of Public Instruction, and Fine Arts The 1913 budget showed estimated expenditure of 4,738,603,534 francs, of which the larger items were as follows. service of the public debt, 1,286,-

423,922 francs, Ministry of War, 983,224,376 francs, Marine, 448,941,062, Public Works, 340,905,255, Public Instruction and Fine Arts, 330,918,486, Interior, 141,961,939, Labor, 106,669,353, Colonies, 105,535,363 The estimated revenues for 1914 were 5,373,517,984 francs, expenditures, 5,373,449,229 The ordinary, extraordinary, and total revenue and expenditure have been as follows, in millions of francs

Year	Revenue			Expenditures		
	Ord	Extrao	Total	Ord	Extrao	Total
1815	729 2	147 2	876 3			931 4
1820	933 4	5 8	939 2			906 7
1830	971 0	40 0	1,020 1			1,095 1
1840	1,160 5	74 0	1,234 5			1,363 7
1850	1,296 5	135 1	1,431 6	1,380 3	92 3	1,472 6
1860	1,722 3	239 9	1,962 2	2,021 8	62 3	2,084 1
1870	1,661 6	1,462 9	3,124 4	1,759 5	1,413 6	3,173 2
1880	2,956 9	573 9	3,530 8	2,826 6	538 0	3,364 6
1890	3,229 4	146 4	3,375 8	3,141 5	146 4	3,827 9
1900	3,814 9		3,814 9	3,747 0		3,747 0
1905	3,766 3		3,766 3	3,706 8		3,706 8
1910	4,273 9		4,273 9	4,321 9		4,321 9
1911	4,689 9		4,689 9	4,547 9		4,547 9
1912	4,857 5		4,857 5	4,742 8		4,742 8

Public Debt—The public debt is the natural result of continued deficits in the national budget and dates from the fifteenth century In 1913 it was $6,349,129,000, as compared with $3,485,818,000 for the United Kingdom, $4,537,861,000 for Russia, $2,852,418,000 for Italy, $1,028,564,000 for the United States, and about $1,177,418,000 for the German Empire. In 1906 it was $5,655,134,000 The indebtedness per capita is far beyond that of the principal countries of the world, but is less than that of Portugal, Honduras, and New Zealand The following table shows at various dates the capital of the public debt (distinguishing the 3 per cent consolidated debt, the railway debt, other debts, and the floating debt), it also shows the annual interest charge on the consolidated debt (all figures represent millions of francs)

Year	Consol	Ry	Other	Float	Int
1800	714 0				36 0
1815	1,272 0				64 0
1830	4,426 3			262 5	199 4
1848	5,953 9			630 8	244 3
1852	5,516 2				239 3
1871	12,454 3				386 2
1876	19,909 2			1,359 3	748 3
1883	21,493 0			2,336 3	741 8
1887	24,661 9	1,825 4	1,325 2	1,009 8	735 1
1894	25,992 0	1,938 9	1,243 1	1,146 9	762 0
1900	25,838 7	2,044 1	1,171 7	1,054 7	694 0
1905	25,934 0	2,243 1	1,170 0	1,262 7	666 7
1910	25,461 2*	4 821 1	1,167 8	1,299 8	657 7
1911	25,410 2	4,812 7	1,084 8	1,386 0	657 7
1912	25,360 4	4,789 6	1,046 5	1,542 2	657 7
1913	25,310 6†	5,169 3	970 1†	1,523 7	657 7

* Of which, 2,726 3 for the Western Railway (Law of Dec 21, 1909)

† There was a transfer of certain items from "other debts" to the railway debt in 1913

Colonies The area and population (mostly for 1911) of the French possessions are shown in the table below, for some of the dependencies, as French West Africa, French Equatorial Africa, and French Guiana, the figures are only approximations

Colonies and Protectorates	Area		Population
	Sq km	Sq m	
Algeria	575,289	222,119	5,563,828
Tunis	125,130	48,313	1,929,003
French Morocco	416,800	160,926	3,000,000
French West Africa	3,922,900	1,514,632	11,626,000
Sphere of influence in the Sahara	2,394,200	924,400	467,000
Fr Equatorial Africa	1,439,000	555,598	8,940,000
French Somali Coast	120,000	46,332	208,100
Madagascar	585,300	225,984	3,198,889
Mayotta and the Comoro Islands	2,168	837	94,663
Réunion	1,980	764	173,822
French India	509	197	282,379
French Indo-China	803,050	310,058	16,990,220
Saint-Pierre and Miquelon	241	93	4,652
Guadeloupe	1,780	687	212,430
Martinique	987	381	184,084
French Guiana	78,900	30,463	49,009
In the Pacific	24,220	9,351	88,157
Total*	10,496,330	4,052,633	52,912,000

* Including a few other, small dependencies, as Kerguelen, etc, with 3740 sq km (1425 sq m) and no population reported

Considered from an economic point of view, the French colonial system has gone through four stages since its inception in the sixteenth century Previous to the Revolution the colonies were administered with a view to the greatest possible profit to the ruling country In 1825 a change of policy was inaugurated tending to secure to the colonists a large measure of self-government This condition lasted until 1841, when many of the liberties previously granted were revoked, and a stricter financial control by the government was introduced In 1854, however, the colonists acquired considerable independence in fiscal matters While the home government reserves control in some matters, it makes itself responsible for the expenses involved, the most important of which are the support of the army and navy, the salaries of the various government officials, and the maintenance of prisons The right of the colonists to impose their own tariffs was withdrawn in 1892 The colonial governments, as a whole, are not self-supporting The dependencies (excepting Algeria and Tunis) in 1911 had an estimated revenue of about 264,000,000 francs, to which a contribution of 103,500,000 francs by the home government was required to cover expenditure The capital of the colonial debts aggregated 554,372,529 francs on Jan 1, 1912

As far as the budgets of the colonies themselves are concerned, the colonies are allowed free play in the method of raising their revenue, except the right of fixing the tariff duties, but in the matter of expenses there are certain items, called obligatory expenses, for which each colony must make provision in its budget The obligatory expenses include, among others, the payment of interest on the debt, the maintenance of the government buildings, a part of the maintenance and salaries for public instruction, police, insane, and poor children In a work on the French colonial system Professor E R A Seligman of Columbia University, thus sums up the fiscal policy of France towards her colonies. "The French government wavers between two lines of policy. On the one hand, the movement towards local autonomy has granted the colonies substantial rights of fixing their own sources of

revenue and expenditure in accordance with the dictates of local expediency On the other hand, the movement towards centralization or so-called assimilation has taken away from the colonies the privilege of levying their own tariffs and has imposed upon many of the dependencies a system of taxation more suitable to the interests of the mother country than of those of the colonies themselves, has declared certain of the colonial expenditures obligatory, and finally has complicated the relations between the colonies and the home government by a series of subventions on the one hand and of contingents and contributions on the other The most recent and enlightened colonial administrators themselves plead, not only for a simplification of the relations between the colonies and the home government, but also for a larger share of independence and initiative on the part of the colonies themselves"

Imports from and exports to the colonies (special trade, excluding bullion and specie) were as follows in 1910 and 1911, in thousands of francs

COLONIES	IMPORTS		EXPORTS	
	1910	1911	1910	1911
Algeria	446,643	425,581	438,930	489,903
Tunis	72,733	79,302	87,247	90,160
Senegal	71,465	45,095	38,967	35,706
Other West Africa	43,021	37,539	23,565	18,604
Madagascar	17,006	25,676	29,897	36,344
Réunion	24,470	27,119	7,514	8,498
India	20,213	24,265	987	1,298
Indo-China	96,001	109,042	64,143	65,791
Martinique	25,096	25,254	12,392	11,942
Guadeloupe	23,841	22,516	11,725	12,427
Others	81,760	58,513	26,132	27,144
Total	922,249	899,902	741,499	797,817

France controls a somewhat larger portion of the commerce of its colonies than the United Kingdom does of the trade of the British colonies In general, the trade of the more recently acquired possessions is carried on to a smaller extent with France than is that of the older colonies A large part of the French imports into the colonies is at the expense of the mother country and consists of supplies for the troops and equipment material for various government institutions and undertakings

Population The table on page 136 shows by departments the area of France in square kilometers and square miles, the legal population according to the censuses of 1872, 1891, 1901, and 1911 (March 5), the density per square kilometer in 1911, and the living births and the deaths (excluding stillbirths) in 1912

The density of population in France, 73 82 per square kilometer (191 19 per square mile), compares with that of other countries as follows· England, 258 30 per square kilometer, Belgium, 252 04, Java and Madura, 228 87; Netherlands, 171.36, Italy, 120 94, Germany, 120 04, Austria, 95 24, Switzerland, 91 11, Russian Poland, 74 3 (in 1897), Denmark, 70 75, British India and native states, 68 61, Portugal, 64 80; Hungary, 64 19, Servia, 60 28, Rumania, 55 18, Spain, 38 66, European Russia (without Poland), 19 4 (in 1897); United States, 11 96

At the beginning of the nineteenth century Russia was the only European country that exceeded France in population. The Russian dominions are supposed to have had about 45,000,000 inhabitants in 1815 The population of France in 1816 has been calculated at 30,024,000, Germany had in that year 24,833,000, and Italy 18,383,000 At present, among European countries, France ranks fifth in population, being exceeded not only by Russia, but by Germany, Austria-Hungary, and the United Kingdom An approximate idea of the increase of French population as compared with that of other countries is shown in the following table.

France	(1821) 30,461,875	(1861) 37,386,313	(1891) 38,343,192	(1911) 39,601,509
Germany	(1820) 26,294,000	(1860) 37,747,000	(1890) 49,428,000	(1910) 64,925,993
England and Wales	(1821) 12,000,236	(1861) 20,066,224	(1891) 29,002,525	(1911) 36,070,492
United Kingdom	(1821) 20,893,584	(1861) 28,927,485	(1891) 37,732,922	(1911) 45,221,615
Italy	(1825) 19,727,000	(1862) 25,000,000		(1911) 34,671,377
Spain		(1860) 15,673,481	(1887) 17,565,632	(1910) 19,995,446
Russia	(1815) 45,000,000	(1859) 74,000,000	(1897) 129,209,297	(1911) 167,003,400
United States	(1820) 9,638,453	(1860) 31,443,321	(1890) 62,947,714	(1910) 91,972,266

Among the leading nations France has for many years had the smallest proportionate annual increase In this connection, however, should be noted the case of Ireland, where the number of inhabitants increased from 6,801,827 in 1821 to 8,175,124 in 1841 and then steadily declined to 4,390,219 in 1911 The calculated population of France in 1700 was 19,669,320, in 1762, 21,769,163, in 1784, 24,800,000. The population for Jan 1, 1801, was returned at 27,349,003 (or 26,930,756 on the present territory of France), but this figure has been corrected to 27,845,297, in 1821, 30,461,875 (29,871,176 on the present territory), 1841, 34 230 178 (33,400,864), in 1861, 37,386,313 (35,844 902) in 1866, 38,067,064 (36,495,489), in 1872 (after the loss of Alsace-Lorraine), 36,102,921 in 1876 36 905,788, in 1881, 37,672,048, in 1886, 38 218 903, in 1891, 38,343,192 in 1896 38,517 975 in 1901 38 961,945, in 1906, 39 252,245; in 1911, 39,601,509, in 1921 (including Alsace-Lorraine), 39,209,766 The decline in population between the census of 1866 and that of 1872 was 1,964,143, of which 1,597,228 was due to the loss of the territory ceded to Germany The remainder was due to losses in the war and to an absolute decrease of population in 73 departments Between 1881 and 1886 there was a loss of population in over one-third of the departments; from 1886 to 1891, 55 departments declined in population, 62 departments decreased between 1891 and 1901, 55 between 1901 and 1906, and 64 between 1906 and 1911 The departments showing an increase in 1911 over 1906 were Alpes-Maritimes, Ardennes, Territory of Belfort, Bouches-du-Rhône, Finistère, Gironde, Indre-et-Loire, Loire-Inférieure, Marne, Meurthe-et-Moselle, Morbihan, Nord, Oise, Pas-de-Calais, Rhône, Seine, Seine-Inférieure, Seine-et-Marne, Seine-et-Oise, Vosges (all of which had shown an increase in 1906 over 1901), and Doubs, Basses-Pyrénées, and Var The principal cause of the decrease in the 64 departments is stated to be the attraction of the cities. In 1911, communes having upward of 30,000 inhabitants numbered 79, with an aggregate population of 9,053,475, the increase over 1906 being 475,442, while the increase for France as a whole was only 349,242 The 1901 census showed

DEPARTMENTS	AREA		CENSUS POPULATION				Dens sq km	1912	
	Sq km	Sq m	1872	1891	1901	1911		Births	Deaths
Ain	5,825 6	2,249 3	363,290	356,907	350,416	342,482	58 8	6,191	6,031
Aisne	7,428 4	2,868 1	552 439	545,493	535,583	530,226	71 4	10,600	9,777
Allier	7,381 8	2,848 1	390 812	424,382	422,024	406,291	55 0	6,038	6,024
Alpes, Basses-	6 988 4	2,698 2	139 332	124,385	115,021	107,231	15 3	1,848	1,995
Alpes, Hautes-	5,643 1	2,178 8	118,898	115,522	109,510	105,083	18 6	2,166	1,914
Alpes-Maritimes	3,736 3	1,442 6	199,037	258,571	293 213	356,338	95 4	7,222	6,050
Ardeche	5,556 1	2,145 2	380,277	371 261	353,564	331,801	59 7	6,436	5,890
Ardennes	5,252 6	2,028 0	320 217	324 923	315 589	318,896	60 7	6,356	5,650
Ariège	4,903 3	1 893 1	246 298	227,491	210,527	198 725	40 5	3,079	3,322
Aube	6,026 3	2,326 7	255,687	255,548	246,163	240,755	39 9	4,018	4,688
Aude	6,342 3	2 448 8	285,927	317,372	313,531	300,537	47 4	4,803	4,910
Aveyron	8,771 1	3 386 5	402,474	400,467	382,074	369,448	42 1	7,387	6,266
Belfort, Territoire de	608 5	234 9	56,781	83,670	92,304	101,386	166 6	2,140	1,511
Bouches-du-Rhône	5,248 0	2,026 3	554,911	630,622	734,347	805 532	153 5	16,163	14,510
Calvados	5 692 6	2,197 9	454,012	428 945	410,178	396,318	69 6	7,948	8,703
Cantal	5,779 3	2 231 4	231,867	239,601	230,511	223,361	38 6	4,045	3 425
Charente	5 971 8	2,305 7	367 520	360,259	350,305	346 424	58 0	5,971	5,563
Charente-Inférieure	7,231 5	2,792 1	465 653	456 202	452,149	450,871	62 3	7,598	7,184
Cher	7,303 5	2,819 9	335,392	359 276	345,543	337 810	46 3	5,339	5,018
Corrèze	5,887 7	2,273 2	302,746	328,151	318,422	309,646	52 6	5,659	4,432
Corse (Corsica)	8,721 8	3 367 5	258 507	288,596	295,589	288,820	33 1	5,963	4,259
Côte-d'Or	8,786 8	3,392 6	374,510	376,866	361,626	350,044	39 8	5,379	6,157
Côtes-du-Nord	7,217 6	2,786 7	622,295	618 652	609,349	605,523	83 9	14,611	12,320
Creuse	5,606 1	2,164 5	274,668	284 660	277 831	266,188	47 5	3,944	3,725
Dordogne	9,224 2	3 561 5	480,141	478,471	452,951	437,432	47 4	7,931	6,844
Doubs	5,260 0	2,030 9	291 251	303 081	298 864	299,935	56 9	6,584	5,459
Drôme	6,561 4	2,533 4	320,417	306,419	297,321	290,894	44 3	4,704	5,009
Eure	6,037 5	2,331 1	377,874	349,471	334,781	323,651	53 6	6,139	6,799
Eure-et-Loir	5,939 8	2,293 4	282,622	284 683	275 433	272,255	45 8	5,245	5,105
Finistère	7,029 5	2,714 1	642,963	727,012	773 014	809,771	115 2	21,943	13,461
Gard	5,880 7	2,270 5	420,131	419 385	420 836	413,458	70 3	7,071	7,314
Garonne, Haute-	6,367 0	2,458 3	479,362	472 383	448,481	432,126	67 9	6,359	8,167
Gers	6,290 6	2,428 8	284,717	261 084	238 448	221,994	35 3	2,887	4,119
Gironde	10,725 6	4,141 3	705,149	793,528	821,131	829 095	77 3	12,332	13,651
Hérault	6,224 3	2,403 2	429,378	461,012	489 421	480 484	77 2	8,297	8,493
Ille-et-Vilaine	6,992 3	2 699 7	589,532	626,875	613,567	608,098	86 9	12,652	12,331
Indre	6,906 4	2 666 6	277,693	292,868	288,788	287,673	41 1	4,906	4,183
Indre-et-Loire	6,158 5	2,377,8	317,027	337,298	335,541	341,205	55 4	5,967	5,614
Isère	8,236 6	3,180 2	575 784	572,145	568,693	555,911	67 5	9,038	9,750
Jura	5,055 3	1,951 9	287 634	273,028	261,288	252,713	50 0	4,759	4,666
Landes	9,364 0	3,615 4	300,528	297,842	291,586	288,902	30 8	5,112	4 365
Loir-et-Cher	6,421 9	2,479 5	268,801	282,392	275 538	271,235	42 2	4,871	4,397
Loire	4,799 3	1,853 0	550 611	616,227	647 633	640,549	133 5	11,675	10,854
Loire, Haute-	5,001 4	1,931 0	308,732	316,735	314,058	303 838	60 7	5,870	4,985
Loire-Inférieure	6,980 0	2,695 0	602,206	645,263	664,971	669,920	95 7	12,180	11,080
Loiret	6,811 9	2,699 9	353,021	377 718	366,660	364,061	53 4	6,468	5,854
Lot	5,226 1	2,017 8	281,404	253,939	226,720	205,769	39 4	3,081	4,023
Lot-et-Garonne	5,384 8	2,079 1	319,289	295,360	278,740	268,083	49 8	3 648	4,797
Lozère	5,179 8	2,000 0	135,190	135,517	128,866	122 738	23 7	2,724	2,050
Maine-et-Loire	7,218 0	2,786 9	518,471	518,589	514,658	508,149	70 4	8,717	8,848
Manche	6,411 7	2,475 6	544,776	513,815	491 372	476,119	74 3	9,873	10,210
Marne	8,205 3	3,168 1	386,157	434,734	432,882	436,310	53 2	8,479	7,800
Marne, Haute-	6,257 0	2,416 8	251,196	243,533	226,545	214,765	34 3	3,839	4,128
Mayenne	5,212 2	2,012 4	350,637	332,387	313,103	297,732	57 1	6 299	5,878
Meurthe-et-Moselle	5,279 6	2,038 5	365,137	444,150	484,722	564,730	107 0	13,461	10,579
Meuse	6,240 6	2,409 5	284,725	292,253	283 480	277,955	44 5	5,091	4,994
Morbihan	7,092 5	2,738 4	490,352	544,472	563,468	578,400	81 5	14,891	10,153
Nièvre	6,888 1	2,659 5	339,917	343,576	323 783	299,312	43 4	4,315	4,932
Nord	5,773 7	2,229 2	1,447,764	1,736,341	1,866,994	1,961,782	339 7	42,444	31,658
Oise	5,886 7	2,272 8	396,804	401,835	407,808	411,028	69 8	7,842	7,810
Orne	6,144 1	2,372 2	398,250	354,387	326,952	307 433	50 0	5,403	6,658
Pas-de-Calais	6,751 6	2,606 8	761,158	874,364	955,391	1 068,155	158 2	28,418	17,781
Puy-de-Dôme	8,016 1	3,095 0	566,463	564,266	544,194	525,916	65 6	7,900	8,861
Pyrénées, Basses-	7,712 4	2,977 8	426,700	425,033	426,347	433,318	56 2	9 296	7,244
Pyrénées, Hautes-	4,534 5	1,750 8	235,156	225,861	215,546	206,105	45 5	3,318	3 833
Pyrénées, Orientales	4,143 5	1,599 8	191,856	210,125	212 121	212,986	51 4	4,265	3,461
Rhône	2,859 3	1,104 0	670,247	806,737	843,179	915,581	322 0	14,351	15,708
Saône, Haute-	5,375 2	2,075 4	303,088	280,856	266 605	257,606	47 9	4,758	4,623
Saône-et-Loire	8,627 4	3,331 0	598,344	619,523	620,362	604,446	70 1	10,778	9,748
Sarthe	6,244 8	2,411 1	446,603	429,737	422,699	419,370	67 1	8,196	8,090
Savoie	6,187 9	2,389 1	267,958	263,297	254,781	247,890	40 0	4,798	4,558
Savoie, Haute-	4,598 0	1,775 3	273,027	268,471	263,803	255,137	55 5	5,193	4,517
Seine	479 5	185 1	2,220,060	3,141,595	3,669,930	4,154,042	8,664 5	74,527	73,592
Seine-Inférieure	6,342 0	2,448 6	790,022	839,876	853,883	877,383	138 4	20,785	18,038
Seine-et-Marne	5,931 1	2,290 0	341,490	356,747	358,325	363,561	61 3	6,120	6,559
Seine-et-Oise	5,658 9	2,184 9	580,180	628,590	707,325	817,617	144 5	14,301	16,086
Sèvres, Deux-	6,054 3	2,337 6	331,243	354,282	342,474	337,627	55 8	6,415	5,040
Somme	6,277 1	2,423 6	557,015	546,495	537 848	520,161	82 9	9,549	9,630
Tarn	5,780 4	2,231 8	352,718	346,739	332,093	324,090	56 1	5,337	5,245
Tarn-et-Garonne	3,730 6	1,440 4	221,610	206,596	195,669	182,537	48 9	2,743	3,350
Var	6,023 4	2,325 6	293,757	288,366	326,384	330,755	54 9	5,491	5,875
Vaucluse	3,578 5	1,381 7	263,451	235,411	236,949	238,656	66 7	4,011	4,569
Vendée	7,015 5	2,708 7	401,446	442,355	441,311	438,520	62 5	9,185	6,658
Vienne	7,044 1	2,719 7	320,598	344,355	336,343	332,276	47 2	5,915	4,868
Vienne, Haute-	5,555 2	2,144 8	322,447	372,878	381,753	384,736	69 2	7,351	5,394
Vosges	5,903 0	2,279 1	392,988	410,196	421,104	433,914	73 5	9,360	7,574
Yonne	7,460 6	2,880 5	363,608	344,688	321,062	303,889	40 7	4,289	5,466
France	536,463 7	207,128 6	36,102,921	38,343,192	38,961,945	39,601,509	73 8	750,651	692,740

an increase of 458,376 in communes of over 30,000, and the 1906 census, 226 731 In 1911, as also in 1906, there were 15 cities of more than 100,000 inhabitants For 1906 the rural population was returned at 22,715,011, and the urban at 16,537,234 As just stated, the urban population is increasing at the expense of the rural, though in general the discrepancy between urban and rural changes in population is not so marked as in Germany But it must be noted that in certain French departments where the general population is declining the population of their urban centres is increasing Rural population is that which subsists in communes having an agglomeration of less than 2000 In 1846, 24 4 per cent of the population was urban, and 75 6 per cent rural, in 1851, 25 5 and 74 5, in 1861, 28 9 and 71 1, in 1872, 31 1 and 68 9, in 1881, 34 8 and 65 2, in 1891, 37 4 and 62 6, in 1896, 39 1 and 60 9, in 1901, 40 9 and 59 4, in 1906, 42 2 and 58 8

The following table, which includes the communes having a total resident population of over 50,000 in 1911, shows the populations in that year, as compared with 1851 and 1901

COMMUNES	1851	1901	1911
Paris	1,053,262	2,714,068	2,888,110
Marseilles	195,257	491,161	550,619
Lyons	177,190	459,099	523,796
Bordeaux	130,927	256,638	261,678
Lille	75,795	210,696	217,807
Nantes	96,362	132,990	170,535
Toulouse	93,379	149,841	149,576
Saint-Etienne	56,003	149,559	148,656
Nice		105,109	142,940
Le Havre	28,954	130,196	136,159
Rouen	100,265	116,316	124,987
Roubaix	34,698	124,365	122,723
Nancy	45,129	102,559	119,949
Rheims	45,754	108,385	115,178
Toulon	69,474	101,602	104,582
Amiens	52,149	90,758	93,207
Limoges	41,630	84,121	92,181
Brest	61,160	84,284	90,540
Angers	46,599	82,398	83,786
Tourcoing	27,615	79,243	82,644
Nîmes	53,619	80,605	80,437
Montpellier	45,811	75,950	80,230
Rennes	39,505	74 676	79,372
Grenoble	31,340	68,615	77,438
Dijon	32,253	71,326	76,847
Tours	33,530	64,695	73,398
Calais	10,993	59,743	72,322
Orléans	47,393	67,311	72,096
Saint-Denis	15,792	60,808	71,759
Le Mans	27,059	63,272	69,361
Levallois-Perret		58,073	68,703
Clermont-Ferrand	33,516	52,933	65,386
Versailles	35,367	54,982	60,458
Besançon	41,295	55,362	57,978
Boulogne-sur-Seine	7,602	44,416	57,027
Saint-Quentin	24,953	50,278	55,571
Troyes	27,376	53,146	55,486
Boulogne-sur-Mer	30,783	49,949	53,128
Béziers	19,333	52,310	51,042

The French birth rate is the lowest reported for any country Following are comparative figures, relating to the year 1911, for marriages, for living births, and for deaths (exclusive of stillbirths) per thousand inhabitants France, marriage rate 7 8, birth rate 18 7, death rate 19 6, Ireland, 5 4, 23 2, and 16.5, Sweden, 5 9, 23 8, and 13 8, Belgium, 7.9, 23 7, and 15 2, England and Wales, 7 6, 24 4, and 14 6, Netherlands, 7 2, 27 8, and 14 5; Germany, 7 8, 28 6, and 17 3, Austria, 7 6, 31 4, and 21 9, Italy, 7 5, 31 5, and 21 4, Spain, 7 2, 31 8, and 23 7, Hungary, 9 2, 35 0, and 25 1; Bulgaria, 9 6, 40 6, and 21 8 Rumania, 10 5, 43 0, and 25.7; Russia (in 1906), 9 6, 46 8, and 29.8 In France the marriage rate, the rate of living births, and the death rate (exclusive of stillbirths) have varied as follows

Year	Mar	Birth	Death	Year	Mar	Birth	Death
1816	8 5	32 9	24 5	1904	7 6	20 9	19 4
1831	7 6	30 3	24 6	1905	7 7	20 6	19 6
1841	8 3	28 5	23 2	1906	7 8	20 5	19 9
1851	8 0	27 1	22 3	1907	8 0	19 7	20 2
1861	8 2	26 9	23 2	1908	8 0	20 1	18 9
1872	9 8	26 7	22 0	1909	7 8	19 5	19 1
1881	7 5	24 9	22 0	1910	7 8	19 6	17 8
1891	7 5	22 6	22 9	1911	7 8	18 7	19 6
1901	7 8	22 0	20 1	1912	7 9	19 0	17 5

In 1911 and 1912 there were, respectively marriages, 307,788 and 311,929, divorces, 13,058 and 14,579, living births, 742,114 and 750,651, stillbirths, 33,840 and 34,312, deaths of infants under one year of age, 116,659, total deaths (excluding stillbirths), 743,143 and 692,740 The small annual increase of the French population, as compared with the increase in other countries, gives rise to serious apprehension on the part of many French statesmen and furnishes a constant topic of discussion to economists and publicists among all nations This apprehension appears to be unfounded In most of the civilized world population is increasing at a more rapid rate than the production of commodities, prices are higher, the struggle for subsistence is more severe, than at the beginning of this century A decrease in the birth rate, which has already begun, as shown by statistics of many countries, is inevitable, and it is not unlikely that such a decrease, being compulsory, will for a time, by reason of want and keener competition, be attended by an increased adult death rate The readjustment to economic necessity will be most painful in those countries whose total inhabitants are the largest in proportion to the primary producers If the trend to the city, which is far greater in some other countries, does not become too accentuated, there is little to fear for continued economic prosperity and social well-being in "the pleasant land of France"

The population present, as distinguished from the legal population, was 38,844,653 in 1906, of whom 19,099,721 were male and 19,744,932 female Of the males, 9,945,031 were unmarried, and of the females, 9,119,222, married, 8,151,990 and 8,188,834, widowed and divorced, 1,002,700 and 2,436,876 Of the total, 18,449,102 males and 19,126,484 females were French, 96,555 males and 125,607 were naturalized, and 554,064 males and 492,841 females were foreign Of the foreigners, 214,052 males and 163,586 females were Italian, 159,097 males and 151,336 females Belgian and Luxembourgeois, 45,281 and 35,633 Spanish, 35,836 and 52,000 German, 38,220 and 30,672 Swiss, 14,831 and 21,159 British, and 13,559 and 12,046 Russian The annual immigration and emigration is small

By occupation the active population was distributed as follows according to the census of 1906: agriculture and forestry, 8,777,053; manufacturing, 5,979,216 commerce, 2,002,681, domestic service, etc, 1,012,232, public service (including the army), 1,220,154, transport, etc, 887,337, mines and quarries, 281,027, fishery, 78,000, liberal professions, 483,179, total, 20,720,879, of whom 7,693,412 were female

Ethnology The perspective of history re-

constructed by ethnologists is more continuous in France than in any other country In blood the French combine many races—prehistoric Teutonic blond longheads, Alpine or Celtic shortheads, and Mediterranean brunette longheads The stature of conscripts is given as 1 646 meters, and the general cranial index at 83 4, ranging from 75 to 88 But anthropometric characteristics have to be studied with caution, since the tall light-complexioned type, with blue or gray eyes, predominates in the north, the short-headed brunette type, marked by dark eyes and low stature, prevails in the middle and south, and the Mediterranean type, brunette, dark-eyed and short, occurs in parts adjoining Italy and Spain The southern French may be called "Iberio-Celtic" and the northern French "Teuto-Celtic," the language of both being Italic A retrospect of French ethnology includes (1) the modern period of racial coalescence since the Crusades, embracing also nationality and speech, (2) incursions of Saracens (arrested by Charles Martel, 732 A D), Burgundians, Franks (who gave their name to the country), and Visigoths, the last three being Teutons, (3) the Roman conquest and all that it means in racial mixtures, no less than in sovereignty and speech, (4) the earlier settlements of Belgian longheads, Celts, or Gauls, and Aquitanian and Ligurian brunettes, (5) Semitic and Pelasgian settlements, made by Phœnician and Greek colonists, of little account, however, to the ethnologist, (6) the peoples of the earliest Iron and the Bronze age, with a variety of skull types, (7) the Neolithic authors of menhirs and dolmens, exhibiting intermixture of brachycephals and dolichocephals, (8) the Cro-Magnon and the Neanderthal or "Spy man," Paleolithic contemporaries of the cave bear, mammoth, and reindeer, and, back of that, the rudest stone ages, when men are alleged to have lived with the mastodon and *Elephas antiquus*. France has experienced in this long stretch of time and evolution of culture the whole range of climates in which man can exist, ranging from arctic to tropical, together with their fauna and flora

Education Since the Franco-German War the subject of education has been one of intense interest to the French people In this respect France has probably exhibited a greater zeal than any other European country The Republic has considered it of first importance that it should fortify itself with an enlightened citizenship. Accordingly every grade of education has been subjected to a transformation that has been almost revolutionary. In the years 1881–82 were passed compulsory-attendance laws and laws abolishing tuition fees Prior to that time the educational system had been more or less dominated by clerical influence, the Roman Catholic religion being taught, and a large number of the clergy having representation on the teaching staff The influence of clericism was detrimental to republican ideals and institutions Consequently the educational reforms assumed a religious phase and have been more bitterly contested than in any other European country In 1882 the teaching of religion in the schools gave way to the teaching of morals, and by a law of 1886 teaching in the public schools was limited to lay teachers, and schools in which religion was taught received no aid from the government The dissatisfaction on the part of some with this secularization of the schools was shown in the subsequent growth of the clerical *lycees* at the expense of the state schools of the same rank The matter became of grave concern to the government In its desire to lessen the attendance at the religious schools and thereby forestall the hostile influence which was presumably fostered by them, the government secured the adoption of the Associations Bill, which went into effect in 1902 and brought about the dissolution of many religious schools By a second law which made three years' preliminary study in a state school a prerequisite to securing an official state position or to entering a special school, the government practically excluded graduates of clerical schools from admission to some of the leading professions

The public system of education begins with the kindergarten or *écoles maternelles*, which admit children from the ages of two to six years In addition to giving kindergarten instruction they served the function of infant schools where care may be given to children of the laboring classes. The establishment of these schools is optional with the communes The number of pupils in 1901–02 and in 1911–12 respectively was as follows at public lay schools, 411,369 and 514,735, at private lay schools, 7630 and 90,649, at clerical public schools, 53,746 and 1664, at clerical private schools, 281,063 and 13,513, total in lay schools, 418,999 and 605,384, total in clerical schools, 334,709 and 15,177, grand total, 753,708 (376,808 boys, 378,001 girls) and 620,561 (314,697 boys, 305,864 girls) Next after the *écoles maternelles* are the primary schools, attendance at which is compulsory for children between the ages of 6 and 13 (if not receiving instruction elsewhere), or until they have passed the examination for the completion of the course, which many of them do before the end of the compulsory time requirement The instruction, as in the higher schools, is given to the sexes separately The number of pupils at the primary schools in 1901–02 and in 1911–12 respectively was as follows at public lay schools, 3,922,001 and 4,615,063, at private lay schools, 118,328 and 1,007,743, at clerical public schools, 285,033 (of whom, 266,967 girls) and 9264, at clerical private schools, 1,256,461 (of whom, 855,883 girls) and 50,282, total in lay schools, 4,040,329 and 5,622,806, total in clerical schools, 1 509,955 and 59,546, grand total, 5,550,284 and 5,682,352 The figures given here for both infant and primary schools include Algeria The system has resulted in greatly reducing the illiteracy of the country, as is shown from the fact that, in 1880, 16 per cent of the newly married males and 25 per cent of the newly married females were illiterate, as compared with 2 1 and 3 2 per cent respectively in 1910

The secondary schools include state classical colleges (lycees), supported by the state, and communal colleges, supported by the communes, though aided by the state, for boys, and schools of similar rank for girls The following figures relate to public secondary education in 1903 and 1913 respectively number of lycées and colleges for boys, 339 and 342, number of students, 94,205 and 100,203, lycees and colleges for girls, 71 and 138, students, 17,543 and 33,282 In private lay institutions for secondary education there were 19,935 students in 1908, and in private clerical institutions 44,623 students. The course of public secondary instruction covers

five years, the most usual age of students being 13 to 18 The establishment of the communal colleges is optional with the commune The secondary schools award the bachelor's degree The boys' lycées were formerly classical institutions, Latin and Greek occupying the principal place in the curriculum In 1902 an elective system was introduced, making it possible to take either a modern language course or a science course, intended to prepare for a more practical career Also four distinct courses are at the option of the student, but he cannot change from one course to another, or exercise any range of choice within the course selected All courses lead to the same degree and confer the same privileges, and a degree may now be secured without the study of Greek and with only a minimum of Latin History, civics, and ethics receive special emphasis, and the practical point of view is emphasized in the teaching of all subjects The girls' lycées, however, from their introduction about 1881 took little notice of the ancient languages, but emphasized rather the French language and literature The convents still have the patronage of a majority of those taking secondary courses, but the number who attend the newly established lycées is rapidly increasing Many of the secondary schools are attended by both boarding and day students A large number of the more intelligent students are assisted by a system of fellowships Graduation from the secondary schools —public or private—is a prerequisite to securing the ordinary degree from the universities

The interests of higher education are subserved by the 15 state universities and by various state faculties and schools and private special schools From 1808 to 1896 the universities of France were deprived of their autonomy and were little more than degree-conferring groups of faculties In 1896 their autonomy was reestablished The 15 universities are Paris, Lyons, Toulouse, Poitiers, Rennes, Nancy, Montpellier, Aix-Marseilles, Bordeaux, Dijon, Lille, Grenoble, Besançon, Caen, Clermont In addition, there are state faculties or schools for higher or professional education at Amiens, Angers, Limoges, Nantes, Rouen, Tours, and Algiers The faculties of the universities are paid by the state, but the universities are otherwise dependent upon the local community or upon private munificence Numerous benefactors, by their liberal gifts, have shown an interest in the welfare of the universities The response of local communities must naturally vary enormously, and there is therefore a great inequality in the size and prosperity of the different institutions Those located in large and wealthy cities, like Paris or Lyons, have a great advantage over those in smaller towns The enrollment in the University of Paris in 1913 was 17,104, about 44 per cent of the total attendance at the state universities. The French universities attract the most students of law, the number exceeding the total taking a corresponding course in German universities The conditions upon which degrees were formerly conferred made it difficult for a foreign student to secure them, but with the new regulation introduced in 1897 degrees are more easily obtained, and there has consequently been a very large increase in the number of foreign students The following figures relate to public superior education in 1903 and 1913 respectively· students under the law faculties, 10,930 and 16,763; medicine, 6735 and 3247, pharmacy, 2526 and 1312, medicine and pharmacy, 2433 and 1750, Protestant theology, 110—faculty suppressed pursuant to the Law of 1905, sciences, 4401 and 6639, letters, 4142 and 6398, total, 31,277 and 41,109, of the totals there were 2045 foreigners in 1903 and 5560 in 1913

Besides the universities there is a large number of special schools, both government and private, covering almost every phase of science and art The movement towards a more modern technical course of instruction has permeated the school system, having even entered the classical lycées, and in no other country do the provisions afforded for preparing for the practical affairs of life equal those of France Special emphasis is given to instruction in commerce, agriculture, etc Theological instruction is amply provided in private schools established for that purpose Finally, the advancement of knowledge is sought through the organization known as the Institute of France (q v), whose five academies embrace in their scope every phase of learning

The administration of the educational system in France is characterized by an unusual centralization and coordination The highest educational officer is the Minister of Education, who holds a position in the cabinet He is actively assisted by a superior council of 58 members, while a second council exercises advisory powers only The whole state system is divided into superior, secondary, and primary departments, with a director responsible to the Minister at the head of each For the administration of education France is divided into 17 districts called *académies*, and the civil departments serve as subdivisions for each of these At the head of each *académie* is a rector, and at the head of each department an academy inspector, the latter receiving his appointment from the Minister Subordinate to the academy inspectors are the primary inspectors—about 450 in number The prefect of the department, assisted by a council, appoints teachers from an approved list submitted by the inspectors The mayor and council of the communes are responsible for school property The state pays all expenses for teachers, administration, and inspectors of the entire educational system, the departments pay for the erection and furnishing of normal schools, and the communes pay for the erection and furnishing of the local elementary schools. The total expenditure for public primary schools increases annually In 1890 it was 177,142,000 francs (state 120,562,000, and communes 56,580,000); in 1900, 217,878,000 (146,908,000 and 70,970,000), in 1905, 268,-787,000 (182,268,000 and 86,519,000), the state expenditure in 1910 was 216,974,000 francs, and, in 1911, 222,260,000 francs

The educational system provides particularly for the preparation of teachers Separate normal schools for the training of men and women teachers for the elementary grades are provided in each civil department, at which tuition, board, rooms, and books are free Teaching is now a profession in France Each normal student is pledged to teach 10 years, and all candidates for schools must hold normal certificates Besides the elementary normal schools, there are a higher normal school, intended to qualify for inspectorships and other positions of high rank, and another normal school for kindergarten teachers The supervision of the school

is in charge of the primary inspector (serving under the department inspector), who is judge of the teacher's proficiency, and upon whose recommendation depends the teacher's advancement or degradation The schools have no position corresponding to that of superintendent or principal in the American schools After serving the requisite time teachers are allowed to retire on a pension The system is noteworthy in that it secures a high grade of teachers for country districts, inasmuch as the salary depends upon proficiency and is paid by the state, although the commune may supplement this from local funds, as is not infrequently done

The French educational system seems to have failed to meet the educational needs of the country in one important respect As compared with most of the American States, the number of pupils who continue their work into the secondary schools is small Inasmuch as the children are young when they finish the primary course, there is a period in their lives when they are likely to be unoccupied and to lose benefits of the education already acquired France has become aroused to the need of further educational provision for adolescents and adults, and the establishment of some form of night schools has been undertaken with remarkable success Very little, however, has been contributed by the government for their support, their introduction and maintenance being largely in the hands of societies and organizations These schools are sometimes in the nature of continuation schools, but they sometimes follow the style of university extension work or of the illustrated lecture.

Religion Up to Dec 11, 1906, religion was subsidized by the state, the Roman Catholic, Protestant, and Jewish confessions receiving contributions from the budget in proportion to their numerical strength The status of the Roman Catholic church, which embraces a very great majority of the population, was naturally an exceptional one Its relations to the state were defined by the Concordat of 1801 as reenacted in the Organic Articles of the following year By this agreement the church which had been deprived of its property in the Revolution surrendered its claims in return for a guarantee of state support The main provisions of this celebrated instrument were as follows The free and public exercise of the Roman Catholic Apostolic religion was guaranteed by the Republic A new division of the French dioceses was to be made by the holy see in concert with the French government Nominations to the new archbishoprics and bishoprics emanated from the government, while the Pope conferred canonical institutions upon the nominees Before entering on their functions the bishops were required to take an oath of allegiance to the constitution and to promise "to carry on no correspondence, to be present at no conversation, to form no connection whether within the territories of the republic or without, which may in any degree disturb the public tranquillity ' The holy see declared against any attempt to regain the alienated property of the church, but all church buildings which had not been alienated were placed at the disposal of the bishops The government agreed to assign suitable stipends to the bishops and parish priests, and to enact legislation facilitating the bestowal of property for the support of religion by private persons By the Law of Dec 9, 1905, the Concordat of 1801 and the Organic Articles of 1802 were abolished, and state maintenance of Roman Catholic, Protestant, and Jewish clergy came to an end No religion is now recognized by the state This result was the culmination of the opposition of the great majority of Frenchmen to the political influence of the Roman Catholic church, more especially its control over education

No religious census of France has been taken since 1872, and exact estimates of the numerical strength of the different religious faiths are misleading It may be said, however, that about three-fourths of the people are, at least nominally, Roman Catholics The indifference to the church manifested by a large number of members, and the radical opposition to the church and to all religions by nonmembers, and the resulting policy in regard to the church, have brought upon France the charge of being an agnostic nation The source of the opposition is generally considered to be of an historical and political nature The relation of the church with regard to the despised social order prevailing in pre-Revolution days is still charged against it It is suspected of being out of harmony with republican ideals and institutions and of being intent upon grasping power to use against the present form of government This charge is directed particularly against the religious associations The intimate relations of these organizations with the Vatican presumably make their interests clash with those of the Republic During the French Revolution religious orders were disbanded, and the enormous wealth they had accumulated was largely confiscated But they afterward reestablished themselves and became three times as numerous as before the Revolution, there being, in 1901, 3216 establishments for men that were recognized by the government, comprising a membership of 30,136, while there were 2870 recognized and 13,428 unrecognized establishments for women, with a total membership of 129,492 A large part of these were engaged in educational work, which was naturally one of the most potent agencies for the spread of their influence Their wealth had likewise accumulated, and they entered extensively into various kinds of commercial enterprise, which gave them another vantage ground for the exercise of their influence Moreover, by virtue of their standing at Rome they were supposed to have practical control over the regular clergy and the main body of the church, whose sympathies and influence would otherwise presumably be more favorable to democracy Opposition to the church and the fostering of agnostic propaganda is generally supposed to centre in the Freemason and the Socialistic elements of the population, and these factions on the one extreme and the ardent clericalists on the other are pitted against each other In 1882 the opposition to clerical influence secured the abandonment of religious instruction in the public schools, and in 1886 the prohibition of clerical members from holding positions in them These measures were followed in 1901 by very radical laws, directed particularly against the religious associations According to these, all associations must be authorized by the government, and those found to violate the law or to be detrimental to the republican form of government or to good morals and order were to be dissolved Parliamentary consent was necessary to the formation of associations which have foreign directors or a foreign domicile.

The law was especially directed against the association schools, and it was further provided that members of dissolved orders could not teach until their membership with the order was terminated The law excited much opposition, and attempts to enforce it, especially in 1903, were so violently resisted that the government devised further measures, having in view the separation of the churches and the state On March 28, 1904, a bill was passed for suppressing teaching by religious orders in conventual and monastic schools in France, except in institutions from which missionaries were recruited for the colonies

The logical conclusion of these measures was the Separation Law of Dec 9, 1905, which has already been referred to Under its provisions all religions may form voluntary associations for public worship, and the state, the departments, and the communes are relieved from the payment of stipends To make the transition tolerable, a graded system of pensions was established for ecclesiastics of all religious denominations, according to age and term of service and proportional to the official salaries formerly received All buildings used for public worship, and all dwellings in connection therewith, were ordered to be included in an inventory and made over to the voluntary associations for public worship, the churches and other places of worship in practical perpetuity—i e, as long as the associations exist, the dwellings (prelates' residences presbyteries, seminaries, etc), for specified times and rentals The position of the associations was improved by an amendment to the original bill in the Chamber of Deputies, which was agreed to by the Senate, exempting from taxation (except the mortmain tax) all buildings for public worship and belonging to the state, the departments, and the communes, and providing for their leasing at a nominal rental of a franc a year for 99 years Furthermore, processions outside churches were authorized, although mayors of communes were allowed a discretion in forbidding them

This law did not go into effect until Dec 11, 1906, but on December 8 of that year Pope Pius X issued an encyclical in which the French clergy were forbidden to act under the provisions of the Law of 1881 or of the Law of 1905. The arrest on Dec 11, 1906, of Monseigneur Montagnini, secretary of Cardinal Merry del Val, Papal Secretary of State, caused great excitement He was stopped while entering France from Italy, and turned back from the frontier, on the charge of inciting French citizens to disobedience at the behest of a foreign power The archives in the Nunciature at Paris were seized

In proof of a desire to be as conciliatory as adherence to a firm policy would permit, the ministry of M Clémenceau, which had been in power since Oct 23, 1906, introduced a bill supplementary to the Law of 1905 This measure, which was enacted and was signed by President Fallières on Jan 2, 1907, was intended to be, and is generally considered, a compromise in some respects, but was declared unacceptable by the Pope in an encyclical issued on Jan. 11, 1907 Subject to the provision that the Law of 1905 shall remain in full force in so far as it is not contradicted by the Supplementary Act of 1907, the latter declares that, independently of the associations contemplated by the Law of Dec 9, 1905, public worship can be held by means of associations under the Law of July 1 1901, as well as in virtue of the Public Meetings Law of June 30, 1881, under individual initiative, that even in default of the cultural associations provided for by the Law of Dec 9, 1905, the use of edifices intended for worship, as well as the furniture contained therein, shall remain at the disposition of the faithful and of the clergy for the practice of their religion, and the free use of the churches may be accorded either to associations formed under the Law of 1901, or to clergy designated under the declarations prescribed by the Law of 1905, but this usage must be under the conditions of the Law of 1905, and the above-mentioned regulations apply to edifices intended for worship, which, having belonged to ecclesiastical establishments, have been assigned by decree to charitable institutions under the Law of 1905 The Supplementary Act of 1907 also declares that, with its promulgation, the state, the departments, and the communes will recover the free use of the episcopal mansions, presbyteries, seminaries, etc, which are their property, and the use of which has not been claimed by an association formed under the Law of 1905, and that lodging indemnities, falling upon communes where there is no presbytery, will cease, that the property of ecclesiastical establishments not claimed by associations constituted under the Law of 1905 will be assigned, upon the promulgation of this act, to charitable institutions, as provided by said law, without prejudice to assignments which may be made concerning property not dedicated to public worship, that, at the expiration of one month after the enactment of the present law, allowances made under the Law of 1905 to the clergy who have failed to carry out the requirements of that law will be suppressed, and that the failure of members of the clergy to fulfill the requirements of the law will in each case be determined by a joint decision of the Minister of Justice and the Minister of Finance

The new law proved as unacceptable to the church as the Law of December, 1905 The vital objection was that neither law gave official recognition to the Roman Catholic hierarchy In February the Roman Catholic bishops submitted a model contract for the leasing of churches between mayors of municipalities and parish priests. It vested the possession of the church for a period of 18 years in the parish priest, whose subjection to the Bishop was expressly recognized On this basis negotiations proceeded

The opposition to Roman Catholicism has not resulted in a strengthening of Protestantism, nor, though there are occasional defections on the part of the clergy, is there any general movement within the church to break with Rome Protestantism is actually diminishing, and is thought to have lost considerably over one-third of its membership since 1835 (making allowance for the cession to Germany of Alsace-Lorraine), the number at present being probably about 600,000 At the same time the influence of Protestantism under the present government is doubtless out of all proportion to its numerical strength, as is evidenced by the large number of its representatives who are leading government officials The Protestants are most numerous in the south of France, particularly in the Department of Gard There are two branches of the Protestant church, the Calvinistic and the Lutheran, the former con-

taining the large majority of the Protestant population The Jews are supposed to be decreasing and number less than 100,000, the large cities, Paris, Lyons, and Bordeaux, being the chief centres See HUGUENOTS

Charities. Thrift is a national characteristic of the French people, and pauperism has never been prominent in France The policy adopted in dealing with the needy has been characterized by the emphasis which has been placed upon voluntary relief, and upon outdoor and local, as against institutional, relief The state does not recognize that the individual has a legal right to demand alms and does not place the local communities under compulsion to provide means of charity relief Direct parochial taxes for charitable purposes have not been levied since the time of the French Revolution The scheme for charity administration as drawn up under Napoleon I made possible the formation of a *bureau de bienfaisance* in each commune, but it was not made compulsory and has been impracticable in the smaller and poorer communes There is therefore no communal machinery of relief for the poor in a large part of rural France These bureaus (consisting of the mayor of the commune and six commissioners) solicit and receive contributions from private sources, and the bulk of their endowment is secured in this way Special grants are sometimes made by the communes, and a tax is levied upon theatres, balls, etc The bureaus give outdoor relief, the amount of which is likely to be arbitrarily adjusted to the funds at command rather than to the existing needs Many of the communes are provided with hospitals, and sometimes a number of communes jointly use the same hospital Cooperation between the state systems of charity and private charity is minimized, inasmuch as private charity is mainly religious, while the attitude of the state is essentially antireligious

There are, however, two classes of the needy that have been very adequately provided for, viz, the dangerously insane and children The necessity for caring for the first of these is evident Asylums for that class are established in the different departments (although there are also state asylums), and their support is divided between the departments and the communes The state places itself under special obligation for providing for children by virtue of its law which prevents the attempt to fix the responsibility for fatherhood Three different classes of children are distinguished in the system of child relief The children of the first class are under two years old—*enfants du premier âge*—and are placed in the care of a nurse under surveillance of the government authorities, the expenses incurred being divided equally between the state and the department The second group, or *enfants assistés*, includes foundlings, abandoned children, destitute orphans, and *enfants secourus*, not exceeding 12 years of age at the time when the government assumes control over them, although remaining under public control until they reach the age of 21 These children are usually placed in peasant homes until they are 13 or 14 years old, when they are made apprentices—preferably in the same family—under guardianship, the guardians being subject in turn to the oversight of the state-paid department inspectors The other expenses incurred in providing for this group are shared between the state, the department, and the commune A large number of children requiring public attention but not coming under either of the above classes fall in a third group, *enfants moralement abandonnés*, who are generally apprenticed or placed in an industrial school

A departmental system of medical aid was established in 1893, and, according to the statistical returns, by the end of the century about half of the population of France availed themselves of the medical aid thus supplied The government further aids the masses through the establishment of savings banks, through the state monopoly of pawnshops, and, since 1897, by an annual contribution to old-age pensions In 1905 an Act was passed for the relief of the aged poor, the infirm, and the permanently incurable, the expense to be borne by the communes, the departments, and the state The cost to the state alone, as voted, in 1912 was 51,200,000 francs A Law of 1910, amended in 1912, provides for all wage earners old-age pensions, towards which both employers and employees contribute, on Oct 1, 1912, 7,698,856 persons were registered The administration of the charities system is in charge of a department under the Minister of the Interior The influence of the central department operates largely through the prefects, who are responsible to the Minister, and who have a voice in the appointments of boards of managers of hospitals, asylums, and *bureaux de bienfaisance*

Government The present government of the French Republic is based on a series of three so-called 'constitutional" laws, adopted by the National Assembly in 1875 and since that date amended and supplemented at different times by ordinary statutes, called "organic" laws The French constitution, therefore, differs from most written constitutions in not being comprised in a single document Another peculiarity is its brevity and conciseness Only the barest outlines of the government are provided for in the fundamental law, all the details of organization being left to the determination of ordinary statute The numerous limitations upon the power of the government in behalf of individual liberty, which constitute so notable a feature of the constitution of the United States, are wholly lacking in the French constitution It is, in short, a constitution of government and not of liberty That part of the constitution which is contained in the so-called organic laws is subject to amendment by the ordinary processes of legislation, while the provisions of the constitutional laws may be changed only by action of the Chambers united in National Assembly and by absolute majority of all the members

The form of government which has prevailed in France since 1875 may be described briefly as a centralized parliamentary republic The constitution provides for a bicameral Parliament, consisting of a Chamber of Deputies and a Senate, with substantial equality of powers in legislation, the only exception being the exclusive power which belongs to the Chamber of Deputies to originate revenue measures As to the composition of the Chamber and the source from which it proceeds, the constitutional laws contain no provisions except the single one that its members shall be chosen by universal suffrage It was provided by ordinary statute that universal suffrage should be considered as the suffrage of all male citizens at least 21 years of age, who have resided for a period of six

months previous to the election in the commune in which they offer to vote Certain classes who have lost their civil and political rights, or who are in active military or naval service, or who have been judicially convicted of certain crimes, as well as those who have been declared bankrupt, are disqualified It has also been determined by ordinary statute that the Chamber consist of deputies apportioned according to population, on the basis of one deputy to every 70,000 inhabitants In 1914 there were 597 deputies, elected from the 87 administrative departments of France, as well as Algeria and the colonies The departments are subdivided into *arrondissements*, containing approximately equal populations, and one deputy is elected from each When an arrondissement contains a population exceeding 100,000, it is divided into two or more constituencies The deputies are chosen, not according to general ticket (*scrutin de liste*), as presidential electors are chosen in the United States, but by district (*scrutin d'arrondissement*), according to the American method of choosing Representatives Both methods have been tried, chiefly with a view to obtaining party advantage, but since 1889 the single-district method has been in use and seems likely to continue as a permanent institution The constitutional laws make no provision concerning the qualifications of deputies The completion of the twenty-fifth year, however, has been prescribed by statute as a necessary qualification To this is added a number of disqualifications, such as the holding of certain other incompatible offices at the same time The term of service is fixed at four years, unless the Chamber is dissolved earlier, and the members are privileged from arrest during the session, unless taken in the act of committing a crime They are, moreover, exempt from legal responsibility for opinions expressed during the discharge of their legislative duties

The constitutional laws now in force make no provision concerning the composition and organization of the Senate, and but scant provision in reference to its powers A Statute of 1884, which superseded the constitutional law on the subject, provides that it shall consist of 300 members, chosen by electoral colleges in the various departments In each department this body consists (1) of the deputies chosen in the particular department, (2) the members of the general council of the department, (3) the members of the councils of the several arrondissements in the department, and (4) delegates chosen by the municipal councils of all the communes of the department The senators are apportioned among the several departments according to population, the number in each varying from 1 to 10 In contrast to the method of choosing deputies, the senators from a given department are selected on a general ticket (*scrutin de liste*), each elector voting for the whole list By statute the qualifications of senators are fixed at citizenship and the completion of the fortieth year There are also certain disqualifications similar to those in the case of deputies The tenure of senators is fixed at nine years, and, to secure partial renewal, it is provided that the terms of one-third of them shall expire every three years. Originally there were 75 life senators, chosen by the National Assembly, their successors being selected by the Senate By an amendment to the constitution, adopted in 1884, however, this remnant of monarchy was abolished, and it was provided that thereafter vacancies occurring among life senators should be filled according to the manner prescribed for the choice of nine-year senators Senators have the same rights and privileges as deputies and receive the same salary, which at present is 9000 francs a year In addition to its legislative duties, the Senate has two peculiar functions first, its consent is necessary for a dissolution of the Chamber of Deputies—a restraint upon the possible arbitrary conduct of the President, and, second, it acts as a high court for the trial of persons accused of attempts upon the safety of the state

The constitution requires the two chambers to assemble annually in January and to remain in session at least five months The President may convoke them at an earlier date, and he is bound to do so if the demand is made by a majority of the members composing each chamber They may also be adjourned by the President, but the duration of the adjournment cannot exceed one month and is not permitted to occur more than twice in a session Bills may be presented in either chamber by private members or ministers, except that revenue measures must originate in the Chamber of Deputies Whether the Senate has the right to amend bills of this character is a disputed question The Chamber of Deputies denies the right of the Senate to increase its revenue proposals, but the Senate has asserted its right successfully on a number of occasions All bills must be referred to a special committee for consideration before being taken up in either house A measure duly passed by both chambers is sent to the President for his approval. He has neither an absolute nor a qualified veto, although he may demand reconsideration of the measure, and a constitutional obligation rests upon the chambers to consider his objections, but if they repass the measure by the regular majority it becomes law in spite of the President's objections

Although the parliamentary system of government prevails in France and monarchical traditions are strong, the chief executive is elected, not, however, by popular vote, but by a body composed of the members of the two chambers of the Parliament They are required to meet for this purpose at Versailles at least one month before the legal expiration of the presidential term, and in case of the death or resignation of the President they are commanded to assemble immediately and form themselves into an electoral college. A majority of the whole number of members is necessary to elect The only qualification prescribed by the constitution is that the President shall not be a member of any family that has reigned in France His term is fixed at seven years, and it is expressly declared that he is reeligible The President's position is one of irresponsibility except for the offense of high treason, and even then he is subject to arraignment by the Chamber of Deputies only, and to trial by the Senate only

The powers and duties of the President are manifold In the domain of foreign relations his powers include the negotiation of treaties, with the limitation, however, that treaties of peace and of commerce, treaties which add to the financial burdens of the state or which subtract from its territory, or which affect the personal or property relations of Frenchmen in foreign countries, must be approved by the

chambers, the appointment and reception of ambassadors and ministers, and perhaps the power to wage defensive war and, with the assent of the chambers, to wage offensive war Besides the powers of the President in legislation, to which reference has already been made, he may prorogue the Parliament, may initiate legislative measures, and it is his duty to promulgate the laws In the field of administration he has a wide power of appointment and of supervision and an extensive ordinance power The constitution expressly confers upon him the appointment of all officers and by implication the dismissal of most of them He has the power of issuing the necessary ordinances for the execution of the laws where the Parliament has not made provision for the same He has also the power in many cases to issue supplementary ordinances for the purpose of filling out the details of legislative acts, for it must be remembered that it is the practice in France to embody only the main facts in the statutes, leaving minor details to be supplied by executive ordinance The military powers of the President include the disposition of the army and navy, while in the domain of judicial administration he is vested with the power to grant pardons, commute penalties, and issue reprieves

In exercising the above-mentioned powers the President acts through ministers, who are collectively responsible to the chambers for the general policy of the administration and individually responsible for their own personal acts The constitution expressly declares that every official act of the President to be valid must be countersigned by a minister, thus insuring the irresponsibility of the President Theoretically, at least, he is in the position of the British sovereign and can do no wrong In theory the ministers are appointed by the President and serve during his pleasure In practice they are appointed by the leader of the majority in the Chamber of Deputies, and they resign when defeated Legally their responsibility is to both chambers, but, as a matter of fact, it is only to the Chamber of Deputies, and an adverse vote in the Senate no longer leads to the resignation of the ministry Usually the ministers are selected from the members of the Parliament, but whether they are or not, they are entitled to seats in the chambers and must be heard whenever they wish to speak Their duties are of a twofold character In the first place, they are the heads of the several administrative departments of the government, and secondly they are the leaders of the parliamentary majority in the Parliament, and the representatives of the government whose measures they seek to have adopted, and whose general policy they defend against attack The number of ministries or departments is fixed by decree of the President, and varies from time to time In 1914 there were 12 those of the Interior, of Justice; of Foreign Affairs, of War, of Marine, of Public Instruction and Fine Arts, of Public Works, of the Colonies, of Commerce, Industry, Ports, and Telegraphs, of Agriculture, of Finance; and of Labor Besides acting as heads of the departments, they are also members of the Council of State, the highest administrative court in the Republic Their responsibility is both political and criminal Their political responsibility is collective in matters of general policy and single in cases of individual activity and is secured by liability to dismissal from office Their responsibility for crimes committed in the exercise of their duties is to the Parliament, the Chamber of Deputies acting as the accuser and the Senate as the trial court For crimes committed in their private capacity they are responsible to the ordinary judicial courts The ministers are held to their political responsibility through several forms of interrogation in the chambers These are the "direct question," which any member may ask of a minister after previously securing his consent, the purpose being to gain information concerning the policy of the government, and the "interpellation," which is a formal challenge of the government's policy and is usually followed by a vote of confidence or of disapproval Unlike the direct question, the interpellation is always in order, and the consent of the minister questioned or of the cabinet is not necessary

Finally, it should be said that French ministries are short-lived, chiefly on account of the numerous party divisions and factional groups in France As yet no ministry of the Republic has continued in power for a period exceeding three years

The judicial system of France is a purely statutory creation, the only constitutional provision on the subject being that which relates to the constitution of the Senate as an extraordinary court for certain cases By statute a hierarchical system of judicial and administrative courts has been created Of the judicial courts, the highest is the Court of Cassation at Paris, which is composed of a first president, three presidents of sections, and forty-five judges or councilors Next below this tribunal are the 26 Courts of Appeal, each composed of a president and four councilors and with territorial jurisdiction over several departments They hear cases from the Courts of First Instance in the arrondissements, while these in turn hear appeals from decisions of the justices of the peace in the cantons (subdivisions of the arrondissements) These latter try civil cases and act as police judges for the disposal of petty offenses For the trial of criminal cases involving penalties up to imprisonment for five years, police correctional courts without juries are provided More serious crimes are tried by courts of assizes, constituted periodically in each department, and including a jury of 12 men who are the sole judges of the question of guilt, and who fix the punishment The ordinary civil courts are without juries, the judges alone deciding questions of fact as well as of law The judges are appointed by the President of the Republic, and their tenure, except in the case of the justices of the peace, is during good behavior They can be removed only by the Court of Cassation

The administrative courts are an outgrowth of the Napoleonic legislation and are intended to relieve the judicial courts from the decision of administrative questions It is the French theory that such questions should be determined by men who have a practical knowledge of administrative law rather than by judges who have been trained only in the private law The administrative courts are tribunals of enumerated jurisdiction, but the general rule is that they take cognizance of all administrative acts The judges of the administrative courts are all appointed by the President, but, unlike the members of the judicial courts, are removable at

his pleasure They are trained in the work of administration and receive large salaries The most important administrative court in France, as well as the highest, is the Council of State It is composed of 116 members (councilors, commissioners, and auditors), and is divided into four administrative sections and one judicial section It has both original and appellate jurisdiction in a variety of administrative matters Next to the Council of State in importance are the prefectural councils of the departments There is one in each department, and it is composed of several councilors, together with the prefect It has a large contentious jurisdiction in administrative matters, and appeals from its decisions lie to the Council of State Besides these courts, there are a number of special administrative tribunals of minor importance To determine whether the administrative or the judicial courts shall have jurisdiction in a given case, where the question of the forum is in dispute, a Tribunal of Conflicts is provided It belongs to the prefect to raise the question of competence, whereupon the matter is sent to the Conflict Court for determination

Local government in France differs from the English and American systems in several important respects In the first place, the organs of local government in France are not generally authorities of enumerated powers, but are vested with the management and control of all local affairs without any attempt at specification Secondly, to prevent the local organs from misusing such wide powers, the method of central administrative control has been introduced This is the most important characteristic of French local government and, like the system of administrative courts, was inherited from the Napoleonic era While it secures uniformity and symmetry, it destroys the element of local self-government The activities of the local organs are twofold In the first place, they are made use of by the central government for the administration of matters of central concern In the second place, they attend to matters of purely local interest largely according to their own ideas and through officers of their own choosing For the purposes of administration France is divided into 87 departments, in each of which is a prefect, appointed and removed at the pleasure of the President He is both a central and a local officer As agent of the central government, he supervises the execution of the national laws, and decrees and instructions of the ministers, particularly those of the Minister of the Interior, of whom he is a subordinate, issues police ordinances, appoints many officials and directs them in their duties, and makes reports to the government on matters in which it is concerned In this capacity he is assisted by a prefectural council, appointed and dismissed by the President—a body whose advice he is often bound to ask, but never obliged to follow As a local officer, he appoints all the officials in the service of the department, has charge of departmental finances and public improvements, and executes the resolutions of the general council This latter body is the legislative assembly of the department and is chosen by universal suffrage for a term of six years, one-half the members retiring every third year. It holds regular sessions twice a year, and the subjects to which its legislative power extends include departmental property, finances, highways, public works, and poor relief Its resolutions in many cases may be annulled by the central government, and in some cases they must be approved by the President of the Republic to be valid If, e g, in the preparation of the budget, the council should neglect or refuse to make the necessary appropriations or levy the taxes required, the President is empowered to order it done

The next local subdivision below the department is the arrondissement This is an administrative and election district rather than a public corporation for purposes of local government Below the arrondissement is the canton —an election and judicial district of little importance The lowest administrative unit is the commune—a local area of historical growth rather than an artificial creation It may be either urban or rural and varies in size from a few acres to several square miles The two communal organs which correspond to the prefect and the general council of the department are the mayor and the municipal council The mayor, like the prefect, is both a central and a local officer, and since 1884 has been elected by the municipal council As a central officer, he is subject to the control and direction of the prefect He serves during the term of the council by which he is elected, but may be suspended temporarily by the prefect or Minister of the Interior, and removed by the President As central officer, he keeps a register of vital statistics, solemnizes marriages, has charge of the police, and issues ordinances affecting the public health, order, and safety As local officer, he appoints most of the communal officers, administers the local property, draws up the budget, and supervises the execution of the resolutions of the municipal council The municipal council is the deliberative organ of the commune and is elected by universal suffrage for a term of four years It holds four regular sessions annually, may be suspended temporarily by the prefect, and dissolved by the President of the Republic Its duties extend chiefly to purely local affairs, but the approval of the central administration is necessary for the validity of its resolutions on many subjects, such as those relating to the erection of public works, incurring loans, levying taxes, and appropriating money Any act deemed by the central administration to be in excess of its jurisdiction may be declared void Excepted from this general system of municipal government are the capital, Paris, and the city of Lyons, for the government of which a special arrangement is provided

NATIONAL DEFENSE

Army. In order to avoid erroneous conclusions in making comparisons and to comprehend the organization of the French army, it is advisable to consider the basic units on which that organization depends

Infantry—The real basis of the French infantry organization is the battalion Usually a battalion has 4 companies, sometimes 3, sometimes 5 or 6, or even more The number of battalions in a regiment varies greatly The maximum is 4 battalions to the regiment As a rule, the infantry company has 3 officers and 140 men in peace, in war, about 250 men From these data it will be noted that the unit of organization, the battalion with a variable

number of companies, is quite different from the basic unit of the United States army, which is always the regiment of 3 battalions of 4 companies The French battalion at war strength has, on the average, 19 officers and 1009 men, the United States army battalion, 13 officers and 566 men

Cavalry—The basic unit is the squadron, which is composed of 5 officers and 150 men A squadron of French cavalry corresponds more nearly to the United States army troop of 3 officers and 86 men than to the United States war squadron of 4 troops consisting of 14 officers and 363 enlisted men See CAVALRY

Field Artillery—The unit usually taken is the battery, which at peace strength varies from 3 officers and 110 men to 3 officers and 175 men; at war strength, 4 officers, possibly 5 and 175 men, which is almost identical with the United States war battery of 5 officers and 171 men The French mountain battery has about 140 men Light batteries have 4 guns, mountain batteries, 6

Foot Artillery—All officers of artillery including field artillery, are on one list Foot artillery is divided into two branches, coast artillery and fortress artillery The latter garrisons the land fortifications It is believed that in certain cases a part of the fortress artillery may be used with the mobile forces. The total peace strength of foot artillery, including workmen, is about 468 officers and 16,162 men

Technical Troops—There is no division, as in the United States, between signal troops and engineers All technical troops are known as engineers, including the Aeronautical Corps They aggregate 585 officers and about 18,000 men The war strength of the major portion of the engineer companies is 4 officers and 252 enlisted men each See ENGINEER, CORPS OF

The Aeronautical Corps is organized in three groups Each group has from 2 to 4 companies Sections are detached with the mobile army In the spring of 1914 there were 27 sections of 8 aeroplanes each, 10 cavalry sections of 3 aeroplanes each, and 11 fortress sections of 8 aeroplanes each, aggregating a total of 334 aeroplanes There were also 14 dirigibles.

Train Troops are organized into "squadrons", each squadron contains 3 companies Total peace footing, 412 officers and about 10,500 men

Sanitary Troops—About 1500 officers and 6200 men

Veterinarians—About 475 officers

The French army proper is known as the Metropolitan Army and is stationed in France, Algiers, and Tunis The Colonial Army is stationed in France and the French colonies and is distinct from the Metropolitan Army, though both are administered by the War Minister The Colonial Army is made up of both white and native troops

Service in the Metropolitan Army is universal and compulsory, there being no exemptions except for physical disability The period of liability is from the age of 20 to 48, as follows, under the provisions of the Law of 1913 with the colors, 3 years, joining at the age of 20; with the reserve, 11 years, with the territorial army, 7 years, with the territorial reserve, 7 years. This makes a total liability to service of 28 years, ending at the age of 48 Service in the Colonial Army is normally by voluntary enlistment for 3, 4, or 5 years or by voluntary transfer from the Metropolitan Army for the same periods For the West African native troops, however, enlistment may be compulsory The reserve for the active army is called out twice for a period of 4 weeks, the territorial army once for 2 weeks, the territorial reserve has no regular training

Higher Organization—The French Army Corps is recruited from a definite territorial district There are 20 army corps organized in peace and 1 additional Colonial Army Corps in Algeria, making 21 in all Army corps usually have 2 divisions, sometimes 3 There are 2 brigades to a division, 2 infantry regiments to a brigade, which contains from 6 to 8 battalions To each infantry division is attached 1 field artillery regiment of 9 batteries (36 guns) The corps artillery consists of 9 field and 3 howitzer batteries, plus 6 skeleton batteries, which in war give a total of 144 guns per corps To the corps are also attached a cavalry brigade of 2 regiments and certain technical troops The heavy batteries of 2 guns each are distributed as needed by army corps There are 10 cavalry divisions, each made up of 3 brigades of 2 regiments each, to which 2 or 3 batteries of horse artillery are attached Aggregate for a cavalry division, 24 squadrons and 12 guns Based on the above, the army corps presents a combatant strength of about 33,000, the cavalry division about 4700

The *reserve* of the active army and that of the territorial army are each organized into 36 divisions and in addition furnish garrisons for the home stations, the surplus men being called to the regimental depots to supply the losses in battle There would also be available for garrison duty 38 battalions of the Customs Corps and a large number of *chasseurs forestiers*, both of which classes are recruited from the army The gendarmerie (military police), amounting to more than 20,000 men, would be available for local distribution The police force of Paris, called *Garde Républicaine*, about 3000 strong, would be used for similar duties

The Colonial Army, amounting to a total of about 87,000 men (47,000 Europeans and 40,000 natives), should be distinguished from the Metropolitan Army The service in the former is normally voluntary, in the latter compulsory and universal Of the Colonial Army 28,000 Europeans are permanently stationed in France, 19,000 Europeans and 40,000 natives in the French colonies, giving a total of 87,000 men in time of peace The officers and noncommissioned officers of native regiments are French The colonial troops stationed in the colonies include the famous Foreign Legion (2 regiments, each of 4 battalions, headquarters Algeria) in Indo-China; 13 battalions and 4 companies of colonial infantry, 32 batteries of artillery, a squadron of native cavalry, several companies of native sappers, and 49 battalions of native infantry The Metropolitan Army (total peace strength. 639 battalions of infantry, 445 squadrons of cavalry, 694 batteries of artillery) includes 30,000 natives stationed in Algeria and Tunis These, with the 620,000 Europeans in France and 53,000 Europeans in Algeria and Tunis, give a total of 703,000 for the Metropolitan Army The horses maintained for this army number 150,634 Adding the total Colonial Army of 87,000, we have an aggregate of 790,000 for the total peace strength These figures for

1914 do not include administrative corps, staffs and services, military schools, etc

Due to the Law of 1913, increasing the length of service with the colors to 3 years, and to the increased reserve service, the field army of France may be roughly estimated at 800,000 combatants The 36 reserve divisions and reserve cavalry add 500,000 more The Algerian Corps and Colonials in France would add about 80,000 men, giving a grand total of 1,380,000 combatants, available for war.

Administration is by a general staff and several departments under the War Minister, assisted by the Conseil Supérieur de la Guerre, consisting of 12 general officers, among whom are the chief of the general staff, commander in chief in case of war, and the chief of the army staff

The Budget for 1914 provides for an expenditure

For the Metropolitan Army	$209,472,660
Colonial Troops in France	9,866,280
Troops in Morocco	46,779,360
Armament and supplies	21,180,000
Total *	$287,298,300

* Expense of colonial troops abroad not included in this total

The fighting strength of the French army on the initial mobilization was estimated at 650,000 rifles, 60,000 sabres, and 3000 field guns, that of Germany at 1,000,000 rifles, 80,000 sabres, and 5500 field guns

Arms—The French infantry use the Lebel magazine rifle, calibre, 0 315 inch The cavalry has the carbine The field gun is a rapid-fire shielded gun, 2 95-inch calibre, and is considered the best in Europe The howitzer batteries use calibres of 4 inches and 6 2 inches

The *fortifications* of France may be divided into two general classes—seacoast defenses and land defenses, the former to protect a coast line of 1760 miles, the latter a line of 1575 miles The land defenses are usually grouped into three classes, according to their relative strategic importance and corresponding strength of garrison In recent years the tendency has been to place more reliance on the strategic and tactical operations of the mobile army, with the result that many of the second and third class fortified places have been put out of commission On the principal land frontier of Germany the fortified places are Verdun, Toul, Epinal, Belfort, behind which is a second line as follows Maubeuge, La Fere, Rheims, Langres, Dijon, Besançon Along the Italian front are Briançon, Grenoble, and Lyon On the coast line the principal naval stations, guarded by the forts, are Toulon, Rochefort, Lorient, Brest, and Cherbourg

Total War Strength—The mobilization strength of 1,380,000 combatants above estimated could be increased, as war progressed, to possibly 3,000,000, all trained men Upon the complete realization of the intent of the provisions of the Law of 1913, the number will probably reach 3,500,000 *

* In estimating the total strength of armies from figures furnished by different authorities, care should be taken to note what organizations are included and what are omitted, what are without staffs, and what staffs are without organizations, the size of the basic units in war and in peace, whether officers, official administrative services, colonials and native troops are considered, the character and numbers of the several reserve quotas of trained and partially trained men, and to what extent the latter are available for war service.

Navy The French navy, which in 1914 was considered to rank fourth among the powers of the world, is an important element in the national defense and one that is being constantly improved and strengthened It is under the direction of the Minister of Marine, assisted in regard to matters of administration by an Undersecretary of State The Minister presides over an admiralty council, with executive powers similar to those of the British Board of Admiralty. The naval members of this council, which was established in 1913, are the chief of the general staff, the naval director of *personnel*, the director of *matériel*, and the chief of the naval cabinet By a Law passed Feb 13, 1912, the establishment of the French navy was set at 28 battleships, formed into 4 squadrons of 6 ships each, with the remaining 4 in reserve To each squadron were to be attached 2 scout cruisers and 12 destroyers, with 2 cruisers and 4 destroyers to be held in reserve The foreign-service fleet was to consist of 10 ships additional, with such smaller vessels as might be needed, and the submarine flotilla was to consist of 94 vessels, with 4 mine laying ships and such mine-raising vessels as might be required This establishment was to be attained by 1919, and accordingly it was necessary to build battleships at the rate of 2 a year from 1910 to 1917 The extent to which this had been attained by 1914 may be seen from the following résumé of effective fighting ships built and building at the beginning of that year· Of modern battleships, i e, dreadnoughts, there were 8 built, 10 building, making a total of 18, having 394,249 tons' displacement; of older battleships of the pre-dreadnought type, there were 13 built, with a displacement of 163,508 tons, of first-class cruisers, there were 18, with a tonnage of 191,761, and light cruisers 12, with a tonnage of 60,086, of destroyers, there were 83 built and 4 building, of torpedo boats less than 20 years old, there were 153, and of submarines 70 built, with 23 building The French navy is manned partly by voluntary enlistment and partly by conscription The "Inscription Maritime," on which are enrolled the names of the male seafaring population from 18 to 50 years of age, was introduced by Colbert, the Minister of Marine under Louis XIV This list, which contains the names of about 114,000 men, supplies 25,600 conscripts, who ordinarily serve with the fleet, and would supply 50,000 more needed in case of mobilization. In 1913 the *personnel* amounted to 63,859, distributed as follows 15 vice admirals, 30 rear admirals, 360 captains and commanders, 1457 other line officers, 60 midshipmen at sea, 505 engineer officers, 394 medical officers and pharmacists, 219 pay officers, 175 naval constructors, 139 warrant officers and adjutants principaux, 60,505 enlisted men, making a total of 63,859

The French coasts are divided into 5 marine arrondissements, with headquarters at Cherbourg, Brest, Lorient, Rochefort, and Toulon, at all of which stations shipbuilding establishments are maintained Each arrondissement is in charge of a vice admiral, who is responsible not only for administration, but for the mobile and fixed defense of the district In 1912 and later considerable change was made in the organization and disposal of the French fleet The French squadrons in the Far East and the Pacific were suppressed, and the Atlantic division disappeared, the plan being to concentrate the fleet

and especially the more powerful battleships in home waters At the conclusion of the *entente cordiale* and at the opening of the war in the Balkan Peninsula, the battleships were withdrawn to the Mediterranean, and, as a result, the fleet in these waters at the beginning of 1914 was made up as follows first squadron of battleships, *Courbet, Jean Bart, Condorcet, Danton, Diderot, Mirabeau, Vergniaud,* and *Voltaire,* second squadron, made up of older battleships, *Patrie, Démocratie, Justice, République,* and *Verité,* reserve ships, *Bouvet, Gaulois,* and *St Louis,* and the armored cruisers *Waldeck Rousseau, Edgar Quinet, Ernest Renan, Jules Ferry, Léon Gambetta,* and *Victor Hugo* In the Eastern waters the armored cruisers *Montcalm* and *Dupleix* were maintained, and the remaining naval service was performed for the most part by smaller ships

The chief torpedo stations are Dunkirk, Cherbourg, Brest, Lorient, Rochefort, Toulon, Corsica, Bizerta, Oran, Algiers, and Bona At these points torpedo and submarine flotillas, dirigibles and sea planes are maintained, and at Brest is the principal naval school In 1912 a French Navy Aviation Service was established with dirigibles, aeroplanes, hydroaeroplanes, and the necessary hangars, aerodromes, and station ships for their maintenance At Cherbourg, Brest, Lorient, Rochefort, and Toulon there are large government dry docks, and at St Nazaire and Havre large private docks, belonging to steamship companies or shipbuilding establishments The 1914 naval estimate as voted was £19,818,052, an increase of £1,131,007 over 1913, exclusive of extraordinary charges for the naval programme In 1914 the total amount spent on new construction was £10,720,000, of which £4,600,000 was for work in the government dockyards and £6,120,000 in private dockyards Both in private and government dockyards the rate of construction of French battleships has been materially improved.

In 1914 there were under construction in France a number of dreadnoughts which had been laid down in 1913 These were the *Flandres, Gascogne, Languedoc, Normandie,* and the *Béarn,* the last named having been contracted for in 1914. These battleships were to have a length over all of 623 feet, or water-line length of 574½ feet, and a displacement of 24,800 tons, mounting twelve 13 4-inch guns of 35 calibres, in three quadruple turrets on centre lines, besides 24 guns of 5 5 inches of 50 calibres in a secondary battery There were also under construction three battleships, launched in 1913—the *Lorraine, Bretagne,* and *Provence*—each with a length of 546 feet on the water line and a displacement of 23,177 tons, having an armament of 10 13 4-inch guns of 45 calibres, mounted in pairs on turrets, with a secondary battery of 22 5 5-inch guns In 1914 there were projected, and provision was made even before the war with Germany, for four additional dreadnoughts—the *Duquesne, Tourville, Lyon,* and *Lille,* mounting 16 13 5-inch guns These battleships were to have a length of 623 feet and a displacement of 29,500 tons A secondary battery was to comprise 28 5 5-inch guns

In 1914 France had under construction 6 destroyers and 23 submarines Of the latter not less than 6 were of 820 tons' displacement and 400 horse power each. During this year there were completed the dreadnoughts *Paris* and *France,* and in 1913 of the same type the *Jean Bart* and the *Courbet,* having a water-line length of 541 3 feet and a displacement of 23,096 tons, with an armament of 12 12-inch, 50-calibre guns, arranged in pairs in turrets, with a secondary battery of 22 5 5-inch, 50-calibre guns See NAVIES

HISTORY

Gallia, or Gaul, was the ancient name under which France was designated by the Romans. They knew little of the country till the time of Cæsar, who, after a series of wars covering nearly eight years, completed its conquest in 50 B C At this time it was occupied by three branches of the Celtic race—the Aquitani, the Celtæ, and the Belgæ There were also some Germanic inhabitants and a few Ligurians and Greeks, but the latter never penetrated far beyond the shores of the Mediterranean, where they planted colonies, the most important of which was Massilia (Marseilles) Under the Roman rule Gaul advanced rapidly in civilization and refinement and was one of the most important portions of the Empire (See GAUL) With the decline of the Roman power in the fifth century it fell completely under the power of the Visigoths, Burgundians, and Franks In 486 A D Clovis, a chief of the Salian Franks, by his victory over Syagrius near Soissons, put an end to the Roman dominion Clovis embraced Christianity in 496 After his death in 511 his kingdom was divided among his sons, Theodoric, Chlodomer, Childebert, and Clothaire His dynasty, known as the Merovingian, ended in the person of Childeric III, who was deposed in 751, after the reality of kingly power had already passed into the hands of the Mayor of the Palace, Pepin, called Pepin of Heristal, and after him into those of Charles Martel and Pepin the Short, the latter of whom ascended the throne as the first of the Carolingian rulers (See FRANKS, MEROVINGIANS, CAROLINGIANS) The accession of Pepin gave new vigor to the Frankish monarchy, which, under his son and successor, Charles the Great, crowned Emperor of the West by Pope Leo III in 800, became a powerful empire Christianity, civilization, and letters were protected during the reign of Charles the Great, and before his death he had extended the limits of his Empire almost from the Baltic to the Mediterranean, and from the Bay of Biscay to the coast of Illyria After his reign, however, this vast power crumbled to pieces By the Treaty of Verdun, in 843, three years after the death of Louis the Pious, the son of Charles the Great, the Frankish Empire was divided among his sons The lands east of the Rhine, whose inhabitants were predominantly Teutonic in race and language, were assigned to Louis the German, the part corresponding closely to modern France and the southern part of Belgium (the kingdom of the western Franks) fell to the possession of Charles the Bald, between the two lay the territories of Lothair, who, in addition, received Italy and the Imperial title The descendants of Charles the Bald (died 877) possessed little or none of the vigor of the early Carolingians Louis the Stammerer (877–879) was the helpless creature of powerful nobles. Louis III and Karlmann, sons of Louis the Stammerer, were forced to witness the loss of the Rhône valley and the hostile incursions of the Northmen. In 884 Charles the Fat, King of Germany and of Italy, was made King of the western Franks,

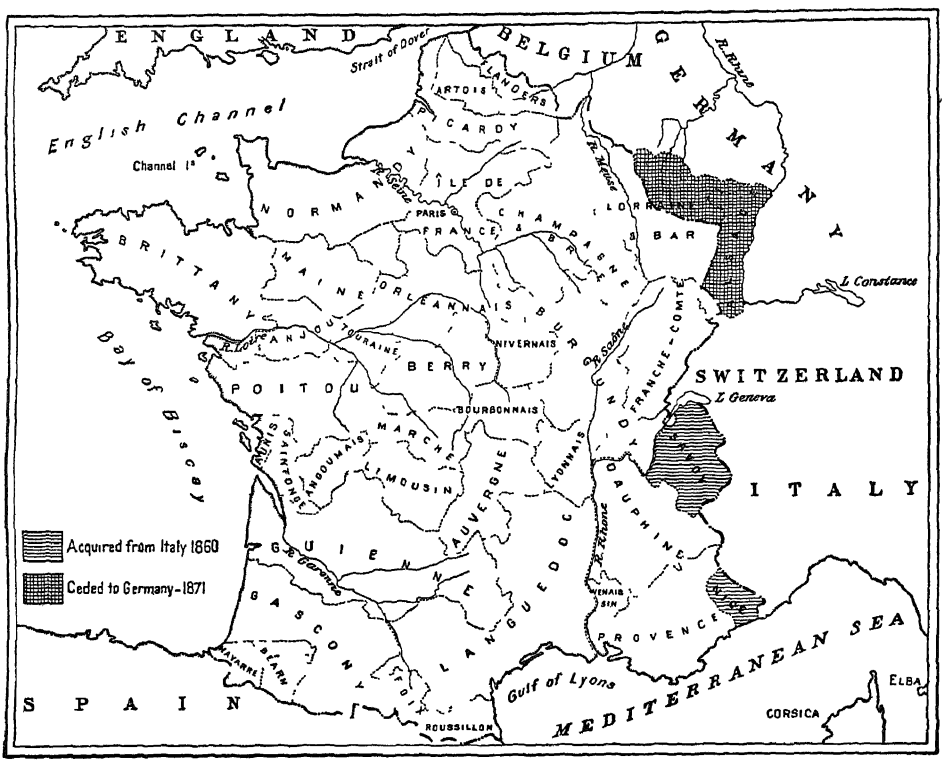
thus reuniting the realm of Charles the Great After a stormy reign of three years, in the course of which Paris all but fell into the hands of the Northmen, he was deposed, and Odo, Count of Paris, was raised to the throne of France Intestine wars desolated the land, and foreign assailants threatened it on every side Under Charles the Simple (893–929) the ravages of the Northmen had assumed so persistent a character that the King was glad to purchase immunity from their encroachments by the cession of the territory subsequently known as Normandy (911) In the kingdom anarchy reigned paramount, the various governors established an hereditary authority in their several governments, and the crown was by degrees deprived of the best part of its possessions The power of some of the vassals surpassed that of the kings, and on the death of Louis V the Carolingian dynasty was replaced by that of Hugh, Count of Paris, whose son, Hugh Capet, was elected King by the army and consecrated at Rheims in 987 See CAPETIAN DYNASTY

At this period the greater part of France was held by almost independent lords, and the authority of the Capetian kings for more than a century extended little beyond Paris and Orléans Among the most important of the great feudal vassals whose possessions made up the lands of the French crown were the counts of Flanders, Vermandois, and Champagne, the dukes of Normandy, Burgundy, and Aquitaine, and the counts of Anjou, Blois, and Toulouse. Louis the Fat (1108–37) was the first of the Capetians who ruled with a strong hand He exalted the power of the crown at the expense of the feudal nobles and increased the royal territory Louis VII (1137–80), who took part in the Second Crusade, was frequently engaged in war with Henry II of England, whose marriage with Eleanor of Aquitaine made him master of that region and Poitou, in addition to his hereditary possessions of Normandy and Anjou. Louis's son and successor, Philip Augustus (1180–1223), wrested Normandy, Maine, Anjou, Touraine, and Poitou from John of England and increased the power of the crown in other parts of France He took a personal share in the Third Crusade and permitted the Pope to organize crusades against the Albigenses in the southern parts of the country The power of the barons in the south was greatly weakened, and ultimately their territory was merged with the royal domains By improvements in the administration of justice, the right of appeal to the royal courts was established, and the arbitrary power of the great vassals crippled It was the policy of Philip Augustus to make use of the clergy and the jurists against the nobles, and it was the jurists especially who aided in the establishment of an absolute monarchy by their introduction of the principles of the old Roman law Under Philip Augustus, France attained the leading place in Europe The King knew how to win the friendship of the Pope without yielding to the papal pretensions He was powerful enough to defeat Otho IV of Germany and his allies at Bouvines in 1214—a victory which secured his hold on the territories taken from King John Improvements in the mode of administering the law were continued under his son, Louis VIII (1223–26), and his grandson, Louis IX (1226–70), who is one of the saints of the Catholic church Louis IX engaged in the Crusades and died in an expedition against Tunis He effected many modifications in the fiscal department and left the kingdom stronger than ever before His son, Philip the Bold (1270–85), annexed the County of Toulouse to the royal domains Philip IV (1285–1314), surnamed Le Bel, or the Fair, acquired Navarre and Champagne by marriage and other territory by money or diplomacy With a view to securing support against the secular and ecclesiastical nobility, with whom he was constantly at war, Philip gave prominence to the burgher element in the nation, and in 1302 he for the first time called together the *états généraux*, or general estates, at which the *tiers état*, or burgher class, appeared, together with the nobles and clergy These changes were, however, accompanied by innovations in the fiscal and other departments of the government, which were effected with haste and violence His tyrannical persecution of the Templars showed the extent to which the regal power could be stretched At the same time the removal of the seat of the papacy to Avignon insured to France a predominant influence in European affairs Under his successors, Louis X (1314–16), Philip V (1316–22), and Charles IV (1322–28), the last direct descendant of the Capetian line, the rule of the kings of France became even more unlimited Philip VI (1328–50), the first of the house of Valois, a cousin of Charles IV and the nephew of Philip IV, ascended the throne in accordance with the Salic law (q v). His reign and those of his successors, John the Good (1350–64) and Charles V the Wise (1364–80), were disturbed by constant wars with Edward III of England, who laid claim to the throne in right of his mother, a daughter of Philip the Fair The Hundred Years' War (q v) began in 1339 In 1346 the English won a great victory at Crecy. In the battle of Poitiers (1356) John was made captive, and, as the war dragged on, the state was reduced to bankruptcy, the nobility excited to rebellion, and the mass of the people greatly impoverished. Debasement of the coinage, onerous taxation, and arbitrary conscriptions brought the country to the verge of ruin, while the victories of England humbled the sovereign, decimated the French armies, and cut down the flower of the nation The insurrection of the peasantry, known as the Jacquerie, occurred in 1358 The long and weak minority of Edward III's grandson, Richard II, diverted the English from the prosecution of their claims to the Kingdom of France, which revived somewhat from the effects of its long and disastrous warfare, but during the minority of Charles VI (1380–1422) the war was renewed with increased vigor on the part of the English nation, who were stimulated by the daring valor of Henry V The signal victory won by the English at Agincourt in 1415, the treason and rebellion of the French princes of the blood who governed the larger provinces, the ambition of the several regents, the ultimate imbecility of the King, the profligacy of his Queen, and the love of pleasure early evinced by the Dauphin, all combined to aid Henry in his attempts upon the throne But the premature death of Henry, the persevering spirit of the people, and the extraordinary influence exercised over her countrymen by the Maid of Orléans (see JOAN OF ARC), concurred in bringing about a reaction, and after a period of anarchy Charles VII the Victorious (1422–61) was crowned at Rheims A fierce struggle,

however, had still to be waged for the recovery of the French provinces from the hands of the English, who were not driven out from Normandy and Guienne until the middle of the century, when nothing but Calais remained in their possession Charles obtained from the States General a regular tax (taille) for the maintenance of paid soldiers to keep in check the mercenaries and marauders who pillaged the country He laid the real foundation for the absolute power of the King by obtaining the support of the third estate

It remained for his successor, however, completely to break the power of the great vassals of the crown and to lay upon the ruins of feudal anarchy the secure foundations of absolutism countered a formidable rival, who bade fair to erect between France and Germany a kingdom more powerful than either, but Charles fell in battle against the Swiss in 1477, and of his possessions the Duchy of Burgundy passed to France Louis XI did not live to consolidate all of France under the crown, but before his death the royal power had been extended over Guienne, Burgundy, Provence, Anjou, Maine, and other regions

Charles VIII (1483–98), by his marriage with Anne of Brittany, secured that powerful principality and consolidated the increasing power of the crown His invasion of Italy in 1494 decided for all the future the relations of France to the other powers of Europe and may be re-



MAP OF FRANCE SHOWING FORMER PROVINCES

Louis XI (1461–83) brought to the task the manifold resources of a wily, unscrupulous nature, true to the moral type of the Renaissance and to those ideals of statecraft which Machiavelli was soon to formulate in his *Principe* The essential meanness of his character and of his entire career was atoned for only by the inestimable benefits which he conferred upon his country Soon after his accession to the throne the princes of the royal blood formed the League of the Public Weal against Louis, ostensibly in defense of the interests of the States General, but in reality out of fear of the growing power of the monarchy Forced to yield in the beginning, the King soon turned their own weapon against them The States General at Tours, in 1468, summoned to consider the question of reforms in the administration and the finances, revoked some of the concessions which the princes had succeeded in extorting from Louis in the Treaty of Conflans, three years before In Charles the Bold of Burgundy Louis en-

garded as marking the beginning of the modern era of international policy With Charles VIII ended the direct male succession of the house of Valois (See VALOIS, HOUSE OF) Louis XII (1498–1515), known as "Le père du peuple," was the only ruler of the Valois-Orléans family. The tendency of his reign was to consolidate the royal power, while the general condition of the people was ameliorated Louis XII engaged in bloody wars in Italy for the possession of Lombardy and the Kingdom of Naples, but failed to achieve any permanent conquests His successor, Francis I (1515–47), of the Valois-Angoulême branch, still intent upon establishing French dominion in north Italy, waged endless wars with the Hapsburgs, which wasted the resources of his kingdom A concordat with the Pope, signed in 1516, secured to the King the right of nominating the Gallican bishops In the reign of Francis the Assembly of Notables superseded the States General The arts and literature were encouraged in this reign, as well

as in that of the succeeding monarch, Henry II (1547–59), who continued the struggle with the Hapsburgs The Emperor Charles V, who had warred successfully against Francis I, being crippled by the events which grew out of his war with German Protestants, Henry seized the opportunity to wrest the bishoprics of Toul, Metz, and Verdun from the German Empire and annex them to France In this reign began the persecutions of the Huguenots (q v)

With the death of Henry II began a period of strife between factions which lasted for more than 30 years and brought upon France the full horrors of civil war The three sons of Henry II—Francis II (1559–60), Charles IX (1560–74), and Henry III (1574–89)—were weak-willed and incapable, and the history of their reigns is the story of a ceaseless struggle for mastery on the part of the powerful house of Guise, carried on under the pretense of a war for religion Opposed to them were the Huguenots, led at first by the Prince of Conde and the great Coligny and later by Henry of Navarre Between the two, and playing off one against the other, was the gifted and unscrupulous Queen mother, Catharine de' Medici Eight civil wars were fought in the space of a generation (beginning with 1562), wars in which the Huguenots did not hesitate to call in foreign aid against their enemies, nor both parties to employ perjury and assassination The Massacre of St. Bartholomew (see BARTHOLOMEW, MASSACRE OF ST), perpetrated by Catharine de' Medici with the aid of the Guises, failed to crush the Huguenots and served only to increase the power of the Guise family, who, as heads of the Catholic League, sought to exclude Henry of Navarre, the rightful heir to the throne, from the succession Henry III, who thought his own life and crown in danger, caused the Duke of Guise and his brother, the Cardinal of Lorraine, to be assassinated (1588), but perished himself by the assassin's knife in the following year, and the crown passed from the house of Valois

The accession of Henry IV of Navarre (1589–1610), a Bourbon prince, descended from a younger son of St Louis, allayed the fury of the religious wars, but his conversion to Catholicism estranged his own party, for whom, however, religious toleration was secured by the Edict of Nantes (1598) The early part of his reign was disturbed by mutinies of the troops and the rebellions of the nobles By degrees, however, Henry, through the astute policy of his Minister, Sully, and by his own personal popularity, raised the power of the crown higher than ever, while he began a system of thorough administrative reform, which was arrested only by his death at the hands of the fanatic Ravaillac in 1610 The first permanent French settlements in Canada were established under Henry IV.

During the first years of the reign of Louis XIII (1610–43), the government was in the hands of the Queen mother, Marie de' Medici. The year 1614 is noteworthy as the date of the last meeting of the States-General before 1789 After 1624 the real ruler of France was Cardinal Richelieu His accession to power speedily put an end to the political intrigues which had disturbed the country during the regency of Marie de' Medici and the personal rule of Louis. Richelieu relentlessly repressed the risings of the Huguenots, who, under their ambitious leaders of the house of Condé, had become a menace to the state La Rochelle, the last of their places of refuge, was taken in 1628, and Protestantism as a political force ceased to exist in France The Huguenots, however, were not molested in the free practice of their religion, as guaranteed by the Edict of Nantes Abroad Richelieu carried on with marked success the contest against the house of Austria, which Henry IV was about to resume at the time of his death The Thirty Years' War in Germany afforded him the opportunity Gustavus Adolphus was maintained largely by French subsidies, and after 1635 it was French aid that made possible the victorious campaigns of Bernhard of Weimar, Banér, and Torstenson Alsace was practically won by 1639, and (though Richelieu did not live to see this) by the Peace of Westphalia (1648) France was confirmed in the possession of the bishoprics of Alsace, and the bishoprics of Metz, Toul, and Verdun, and secured the right to intervene in the affairs of Germany as one of the guarantors of peace

During the minority of Louis XIV (1643–1715) Cardinal Mazarin exerted the chief authority under the Regent, the Queen mother, Anne of Austria The refractory attitude of the Parlement of Paris and the repression of the nobility gave rise to another civil war (see FRONDE), but with the assumption of power by young Louis (1661) a new era commenced Supported by the financial ability of Colbert, who was a mercantilist, the military genius of Turenne, the engineering skill of Vauban, and the organizing talent of Louvois, Louis made France the great power of Europe Franche-Comté and a part of Flanders were added to France by the Treaty of Nimeguen (1678) The ambitious schemes of Louis forced the powers of Europe in self-preservation to unite against him Within, Louis reigned as absolute monarch, concentrating all the power of government in himself The progress of the people in the arts of peace was accomplished with rapid strides Under the inspiration of the *Grand Monarque* French society attained a degree of culture and refinement that had not been known even in the days of the Italian Renaissance This, too, was the golden age of French literature The French language and customs exercised an immense influence on the manners of the higher classes throughout Europe, being not the least potent in distant and barbaric Russia The court of Louis XIV became the model for European princes There was, however, a dark side to the picture The oppressive war taxes, the prodigality of the court, the luxurious lives of the clergy, and the absolutism and bigotry of the aged monarch combined to undermine the foundations of national prosperity and freedom The latter part of Louis XIV's life was marked by a long series of misfortunes The French armies were repeatedly defeated, the prestige of France was destroyed, and only the jealousy of its enemies saved it from utter humiliation The War of the League of Augsburg (1689–97) was marked by the defeat of the French in the naval battle of La Hogue (1692), which wrested from them the mastery of the seas With the outbreak of the War of the Spanish Succession (see SUCCESSION WARS) came the downfall Louis XV (1715–74) succeeded to a heritage whose glory was tarnished and to a throne whose stability was shaken to its very foundations The reign of Louis XV presents nothing worthy of notice

except the acceleration in the process of dissolution of the monarchy and the development of revolutionary influences The regency of the profligate Duke of Orléans brought the nation to the verge of bankruptcy (See LAW, JOHN) The struggle with England in the Seven Years' War (q v) stripped France of Canada and Louisiana, while the capricious change of policy which the King's mistresses, Madame de Pompadour and Madame du Barry, forced upon the governments brought contempt upon the country During this reign the Order of the Jesuits, over which there was much controversy, was banished from France (1764) In 1774 Louis XVI, a well-meaning but weak prince, succeeded to the throne and to the consequences of all the errors of his predecessors His first ministers, Maurepas, Turgot, and Malesherbes, failed in their attempts to carry out the necessary reforms and were compelled to yield to the intrigues of the nobility and higher clergy and resign their places They were succeeded by the financier Necker, who endeavored by economy and method to arrest the impending bankruptcy of the state, and succeeding ministers (Calonne, Lomênie de Brienne) made futile attempts to diminish these financial disorders by new forms of taxation, which were generally opposed by the court The nobles, the clergy, and the third estate were alike clamorous for a meeting of the States General, the privileged estates wishing to impose new taxes on the nation, and the third estate determined to inaugurate a thorough and systematic reform, especially of the land system After much opposition on the part of the King and court, the States General, which had not met since 1614, assembled at Versailles on May 5, 1789

France was ripe for revolution Thoroughgoing reforms at the beginning of Louis XVI's reign might have averted the catastrophe, but a vacillating King, and ministers strong enough to aspire after the good without the power to achieve it, had served only to intensify the feeling of universal discontent, and to bring out in greater contrast than ever the irreconcilable antagonism between the new spirit of the age and the antiquated forms of government and society in France In other countries of Europe the condition of the lower classes was as unhappy the incapacity of government as apparent, the survival of feudal customs as oppressive as in France, but in France alone had the newer intellectual life developed such activity as to render it incompatible with the continued existence of ancient institutions Absolutism in France had been developed at the expense of feudal rights and popular liberties and had drawn to itself almost all the functions of national life, but absolutism since the time of Louis XIV had failed in its duty to the nation, and appears in the ancien regime as a ponderous, rusty machine, making itself felt chiefly by its weight

Under the old régime the internal administration of the country rested in the hands of the King's Council and of the Comptroller General Finance, justice, and legislation were all under the control of this powerful Minister, who acted in conjunction with various subsidiary councils The country was divided into 32 provinces or generalities, each under an intendant, who was the agent of, and responsible to, the Comptroller General Except in the *pays d'état*, where the local magistrates retained some measure of self-government, the intendant united in himself the various functions of administration police, public works, the care of the poor, and, chief of all, taxation Through his subdelegates he collected every year the amount of the taille and other direct taxes assessed upon the province by the King's Council The process of administration was cumbersome Minute matters of local importance had to be passed upon by the Comptroller General in Paris, and, as a result, the provincial administration, though meaning probably to be neither harsh nor unjust, succeeded for the most part in being both

Socially the people of France were divided into two great classes—those who paid the taille and those who did not Among the latter were the nobility, numbering some 140,000 souls and owning about one-fifth of the soil They held exclusive possession of the high offices at court they were exempt from the *corvée*, or forced work on the roads, and from service in the militia Originally exempted from payment of the taille because it was regarded as a commutation paid by the lower classes in lieu of military service, the nobles retained their exemption long after they had ceased to render military service In the payment of indirect taxes they also succeeded in evading a large part of their share For the nobles there were the old privileges and immunities, the ancient rights of fines and dues and tithes, of hunting and fishing and warren, of toll on mill and wine press, but the ancient service of protection and of guidance to the vassal was gone A distinction, however, should be made between the court nobility, who lived in magnificence at Paris or Versailles and aided in heaping up the enormous deficit with which the extravagance of the court was weighing down the country, and the country nobles, who constituted the great body of the class and lived in retirement on their estates, poor, inactive, since absolutism would make no use of them as its agents, and a burden, though very often an unwilling burden, to their tenants The church comprised some 60,000 monks and nuns and 70,000 of the secular clergy out of a total population of about 23,000,000 Between the prelates of the church and the great body of the poor priests was the same gulf that separated the court nobility from the resident nobles The mass of the French priesthood was unselfish, devoted, zealous in its duties, but among the higher clergy, the archbishops and bishops, there were many who were no less selfish and ambitious than the nobility Like the nobility, they were eager to escape their fair share of taxation and hungered after dues and tithes The church owned about one-fifth of the land in France and, with the nobility and the crown, shifted its burdens upon the remaining two-fifths Privilege ruled also in the middle classes In the towns the line of cleavage between the bourgeoisie and the artisan population was definite Trade and industry were regulated by the guilds after the selfish spirit of mediæval times Municipal offices were put up by the government for sale and, as they generally carried with them certain privileges and immunities, chief among them relief from taxation, were greatly sought after Powerful corporations were as assiduous in swearing off taxes as their modern successors The rich burgeoisie, in short, vied with the nobility and the church in evading the burdens of state

It was upon the peasantry, then, that the full

brunt of taxation fell Serfdom was almost extinct in France, more than one-fifth of the land was held by peasant proprietors, and, strangely enough, throughout the eighteenth century more and more land passed into the hands of the peasants in spite of the almost intolerable exactions imposed upon them Yet Taine has calculated that four-fifths of the fruits of the peasants' labors were taken away by the government in the form of taille, *corvée*, poll tax, *vingtiemes*, the *gabelle*, or salt tax, internal revenue, and tariff duties The lands of the church and of the nobles were cultivated by the peasants under the *métayer* system, where the owner supplied the stock of implements, and the peasant the labor, both sharing equally The general state of agriculture was wretched The methods pursued were those of the early Middle Ages, want was the chronic condition of the working population, famine a frequent phenomenon, and mendicancy increased to an enormous extent In 1777 there were 1,250,000 beggars in France Rioting was frequent, and the criminal class drew recruits in plenty from among the proletariat of town and country

Against the critical and utilitarian spirit of the eighteenth century the irrational and antiquated in government and society could not hope to maintain itself Absolutism was assailed by Montesquieu in his *L'Esprit des lois*, which held up the ideal of constitutional liberty as realized in Great Britain, Voltaire waged a ceaseless warfare of keenest ridicule and biting wit against the absurd and anomalous in church, state, and society Rapidly the conviction grew of the utter worthlessness of existing things and of the necessity for immediate and radical change The revolt against the actual attained its climax in Rousseau In the face of privilege, injustice, and oppression, he invoked the law of nature to establish the equality of man To the peasantry and the artisan class equality meant the just redistribution of public burdens; to the cultured, ambitious bourgeoisie, an equal opportunity with the nobles for sharing in the national life "Liberté, Egalité et Fraternité" became the watchword of the downtrodden French peasants.

For an account of the period from 1789 to 1799, see FRENCH REVOLUTION, THE

Bonaparte showed consummate skill in reorganizing and centralizing the government, which had been too much localized under the Revolution. He then took the field in the spring of 1800, led an army over the Alps, and attacked the Austrians in Italy, while Moreau was intrusted with the conduct of the campaign in southern Germany The victories of Marengo and Hohenlinden decided the fate of the war In 1801 the Peace of Lunéville was concluded with Austria and the German Empire, and the boundaries of France were extended to the Rhine In the Peace of Amiens in 1802, England recognized the changes wrought by the Revolution and Bonaparte in the map of Europe The period of respite from war was employed by the First Consul in revivifying trade and industry and in obliterating, both in private and public life, the devastations wrought by the Reign of Terror. In 1804, after an appeal through universal suffrage to the nation, Bonaparte became Emperor, as Napoleon I The Pope came to Paris to crown Napoleon and his wife, Josephine, a new nobility was rapidly created, and the relatives and favorites of the Emperor received vanquished kingdoms and principalities at his hands In 1805 Napoleon assumed the title of King of Italy Austria, which ventured to rise up against him, was overthrown, together with her ally, Russia, at Ulm and Austerlitz (1805), and compelled to sign the Peace of Pressburg, by which the existence of the Holy Roman Empire was formally brought to an end (1806) Prussia was humiliated at Jena and Auerstadt (1806) and brought to the verge of destruction, the Russians were overthrown at Friedland (1807), and the Czar was forced to enter into an alliance with the French Emperor (Treaty of Tilsit, 1807), by which the arbitrament of affairs in Europe was divided between the two In the meanwhile, however, England, having renewed the struggle against France, had gained the complete mastery of the seas by the victory of Trafalgar (1805) Against this archenemy Napoleon brought to bear the united strength of Europe in an effort to destroy her commercial supremacy by a system of ruinous blockades (See CONTINENTAL SYSTEM) In 1807 the forces of Napoleon invaded Portugal and expelled the reigning family In 1808 he took possession of Spain, whose inhabitants rose against him, and which became a great battlefield between the English and French We see here for the first time a national war in Spain as opposed to the dynastic wars of the past Napoleon's inability to gain control of the situation in Spain was one of the most potent causes of his subsequent downfall The height of Napoleon's power was attained in 1809, when the Austrians in a third war were overthrown at Wagram and in the Treaty of Schonbrunn suffered a further loss of territory By his marriage with the Archduchess Maria Louisa, daughter of the Emperor of Austria, Napoleon attempted to give to his throne the prestige of birth, which alone it lacked. For some years, while his military operations were confined to the Spanish peninsula, Napoleon could devote his energies towards consolidating his government and organizing a thoroughly centralized administration His impress on the character of French institutions has persisted to the present day the legal system of France is based primarily on the Code Napoléon (1804), and the relations between church and state up to 1906 were largely determined by the Concordat which the Emperor concluded with the Pope in 1801 The period was one of noted intellectual progress Chateaubriand and Madame de Stael gave the initial impetus to the romantic movement in literature and in the field of science stand out the names of Bichat, Lamarck, and Laplace.

The disastrous Russian campaign of 1812 was the beginning of Napoleon's downfall Of the grand army of more than 500,000 men which he led into Russia in June, only 100,000 recrossed the Niemen in December under the command of Murat, the Emperor having hastened to France to raise new levies Europe now rose against the conqueror In February, 1813, Prussia entered into an alliance with Russia, and these powers were soon joined by Austria and Sweden Napoleon defeated the Russians and Prussians at Lutzen and Bautzen in May and gained a splendid victory over the Allies at Dresden in August, but in October he was overwhelmed in the great battle of Leipzig He was driven from Germany, France was invaded, and on March 30 Paris surrendered to the Allies

Napoleon was compelled to abdicate and retired to the island of Elba, the sovereignty of which had been granted to him His family were declared to have forfeited the French throne Of all her conquests France was allowed to retain only a few strips of territory on her eastern border, together with Avignon and Venaissin On May 3 Louis XVIII, the brother of Louis XVI, made his entry into Paris, and the period of the First Restoration began

The conduct of the restored Bourbons was not such as to conciliate the nation, they returned loaded with debts, and surrounded by the old nobility and clergy, who had not learned to renounce their former privileges, and who looked upon the generation of Frenchmen which had arisen during their absence as their natural enemies The hopes of a liberal government, aroused by the granting of a constitution in the Charte Constitutionelle (June 4, 1814), failed of realization A narrow spirit influenced the policy of the King, which led to the establishment of a strict censorship, the extension of the powers of the police, and the persecution of all the adherents of the Empire. The lower classes and the army, who were alike sensible of the humiliating reaction which had followed the former excitement of war and conquest, were treated by the returned émigrés with indifference and contempt The general discontent with the monarchy afforded the exiled Emperor an opportunity of which he was not slow to avail himself On Feb 26, 1815, Napoleon left Elba, and on March 1 he landed in France Crowds followed him, the soldiers of the Empire flocked around his standard, and the Bourbons fled before him The news of his landing spread consternation throughout Europe. The deliberations of the Congress of Vienna (q v) were suspended, and on March 25 a treaty of alliance was signed at Vienna between Austria, Russia, Prussia, and England, and preparations were at once made to put down Napoleon and restore the Bourbon dynasty At first the prestige of success seemed to attend Napoleon, but on June 18 he met his final defeat at Waterloo (q v) On July 8 Louis XVIII reentered Paris A week later Napoleon gave himself up to the English and was sent to the island of St Helena, where he died in 1821

The Second Restoration gave occasion to many pledges of a more liberal policy on the part of Louis, but these were disregarded in the Royalist reaction that now set in In spite of the King's promises of amnesty, many of those who had gone over to Napoleon during the Hundred Days were brought to trial before tribunals expressly instituted for that purpose The most prominent of the victims was Ney, who was found guilty of treason, and shot Dec. 7, 1815. A number of peers, created by Napoleon, were expelled from the Upper Chamber In some of the provinces the adherents of the Bourbons entered upon a course of violence and murder, the so-called "White Terror" Long after physical violence subsided, reactionary legislation went on The suffrage law was repeatedly tampered with, until the preponderance of power had been placed in the hands of the great landowners In matters of public education the King was completely under the control of the clergy, who constituted the extreme party among the reactionists In 1824 Louis XVIII was succeeded by his brother, the Comte d'Artois, as Charles X Ministerial incapacity, want of good faith, general discontent, and tendencies to absolutism characterized this reign, which was abruptly brought to a close by the revolution of July, 1830 With Charles X the direct line of the house of Bourbon came to an end Louis Philippe, Duke of Orleans, was elevated to the throne by the will of the people. He became King of the "French," not of "France" The first years of the reign of this "Citizen King," who was the representative of the prosperous commercial and industrial classes, were disturbed by insurrectionary riots of the silk weavers in Lyons and disturbances in Paris Attempts on the King's life were frequent, but the progress in material prosperity made the government popular with the bourgeoisie, and for a time it held its ground The warlike propensities of the nation found an outlet in the conquest of Algeria (1830–47) But the determined resistance of the King to the growing demand for electoral reform led at last to open insurrection in Paris Louis Philippe abdicated, Feb 24, 1848 A provisional government was at once instituted, including such men as Dupont de l'Eure, Lamartine, Ledru-Rollin, Etienne Arago, Crémieux, and Garnier-Pagès On February 27 the Second Republic was formally proclaimed Under the auspices of Louis Blanc the new government proceeded at once to exert the activities of the state in behalf of the working classes, for whom it was proposed to establish national workshops On April 27 a decree was issued abolishing slavery in the French colonies In the mean while elections were held for a Constituent Assembly, which met on May 4, and which a few days later elected an Executive Commission to conduct the affairs of the Republic The radical Republicans (the so-called Red Republicans) and the disappointed Socialists soon manifested their hostility to the new order by a resort to arms There were Red Republican disturbances in Paris on May 15, and a great Socialistic uprising in the capital, June 24–26, in which a large mass of the Parisian populace was involved, was suppressed by General Cavaignac only after terrible bloodshed On November 4 the Constituent Assembly completed the framing of a regular republican constitution for France, and on Dec 10, 1848, Louis Napoleon, nephew of Napoleon I, was elected President, entering upon his office December 20 One of the first acts of the administration of Louis Napoleon was the sending of a French expedition for the restoration of the temporal power of Pope Pius IX, which was accomplished in July, 1849 In May, 1849, the Constituent Assembly closed its sessions and was succeeded by the Legislative Assembly The President betrayed the true nature of his policy by appointing, on Oct 31, 1849, a thoroughly Bonapartist ministry (See NAPOLEON III) By the famous coup d'état of Dec 2, 1851, he violently set aside the constitution and assumed dictatorial powers He adopted his uncle's methods in many ways, concealed his seizure of the title by a sham plébiscite, and became Emperor of the French, Dec. 2, 1852

Napoleon III established a government which was virtually a perfected absolutism, veiled by the forms of a parliamentary régime and a system of universal suffrage controlled by the agents of the Emperor There was a Senate, which was the guardian of the constitution, and a legislative body, but the Senate was almost entirely appointed by the Emperor, and in the

Lower House there was no freedom of debate The freedom of the press was practically abolished Force, however, could not be depended upon as a permanent sanction of legitimacy, and to secure the support of the people it was necessary for Napoleon to enter upon a brilliant foreign policy The alliance of England and France against Russia in 1854 and the outcome of the Crimean War were personal triumphs for the Emperor With the meeting of the Congress of Paris in 1856 that city became the diplomatic capital of Europe The Emperor aspired now to play the rôle of arbiter of Europe In 1859, as the champion of oppressed nationalities, he came to the aid of Italy against Austria and as a reward obtained possession of Savoy and Nice He failed, however, in his attempt at intervention in Poland in 1863 and in the affair of Schleswig-Holstein in the following year Actuated, perhaps, by the dream of a French hegemony in Latin America, he seized upon the disturbed condition of Mexico as an opportunity for invading that country and establishing a dependent empire there under Maximilian of Austria. The fall of Maximilian's Empire in Mexico was a fatal blow at his prestige The defeat of Austria in 1866 and the consequent rise of Prussia threatened to deprive France of the leading position she occupied in European affairs. At home, the period of the Second Empire was marked by great industrial development Schools, banks, and cooperative societies sprang up all over France Trade with America and other foreign countries was enlivened Stimulated by the magnificence of the court, life took on an aspect of almost reckless luxuriousness. Vast fortunes were made in railroad building, government contracts, and speculation A great system of public works was carried out, including the building up of a new and beautiful Paris. (See HAUSSMANN) The international expositions of 1855 and 1867 testified to the prosperity of the country. Nevertheless, signs of dissatisfaction were not wanting, and after 1863, in proportion as Napoleon's foreign policy broke down, discontent and criticism grew loud in France. As early as 1862 the Emperor was compelled to allow some measure of debate in the legislative bodies, and in 1867 this was largely increased Opposition to the Empire, however, grew bolder and fiercer, until in 1869 the Emperor saw himself driven to grant a responsible ministry It was soon found that the responsibility of the ministry was fictitious, and that the Emperor availed himself of its protection to cloak his own acts of personal government The result of the appeal made to the nation in 1870, on the plea of securing its sanction for his policy, was not what he had anticipated, and the 50,000 dissentient votes given by the troops in this plébiscite revealed a hitherto unsuspected source of danger The necessity, however, of regaining his lost prestige by a brilliant foreign policy led him to enter once more upon an aggressive course of action in European affairs The question of the succession to the vacant Spanish throne precipitated a crisis between France and the Prussian government, whose foreign policy was guided by the genius of Bismarck Deceived by the false representations of his ministers with regard to the efficiency and preparedness of the French army, Napoleon allowed himself to be carried into war with a power which but recently (see SEVEN WEEKS' WAR) had revealed its surpassing military strength and had been silently preparing for the decisive conflict with France Rarely has the bubble of power been so suddenly pricked as in the case of Imperial France in 1870 (See FRANCO-GERMAN WAR OF 1870–71) After a quick succession of utter defeats for the French, Napoleon surrendered at Sedan, Sept 2, 1870 On September 4 the Corps Legislatif declared the Emperor and his descendants forever excluded from the throne and created a Government of National Defense France was proclaimed a republic A period of stress and disorder ensued An armistice in January, 1871, was followed by the meeting of the first National Assembly of the Third Republic at Bordeaux in February The preliminary treaty of peace with Germany was signed at Versailles on February 26 and ratified by the National Assembly on March 1 France agreed to cede Alsace, together with parts of Lorraine, including Metz, and to pay an indemnity of 5,000,000,000 francs Not until the final payment of the enormous war indemnity in September, 1873, was France wholly freed from the humiliating occupation by foreign troops (See PARIS) In the spring of 1871 the violent outbreak of the Commune (q v), who feared the Assembly was hostile to the Republic, convulsed France, but was suppressed with rigorous severity On Aug 31, 1871, Thiers, who had been elected Chief of the Executive by the National Assembly in February, received from that body the title of President of the Republic

There was not for years a true republican majority in France, but the adherents of the Republic were able to hold their own because of the divisions in the ranks of the Monarchists (See POLITICAL PARTIES, *France*) In 1873 Thiers resigned the presidency, and Marshal MacMahon was elected by Monarchist votes and confirmed in the presidency for a period of seven years (the Septennate) Finally, in 1875 the Assembly adopted laws providing for the constitution of the National Legislature, the legislative power to be vested in a Senate and a Chamber of Deputies. On account of the increase of Republican strength in the Chamber of Deputies, MacMahon resigned in 1879, and Jules Grévy was elected to succeed him

After 1879, under various changes of ministry, the policy of the government continued steadily republican At the instance of Jules Ferry a decree was issued in 1880 by which the Jesuit schools were closed, and all religious orders that would not submit to certain conditions necessary to gain the state sanction were dissolved In 1884 the constitution and the senatorial electoral system were revised and put upon their present basis Labor unions were legalized Members of the royal houses that had formerly ruled France were declared ineligible for military or civil office In 1881 France entered upon an active colonial policy by undertaking a military expedition to Tunis and establishing a protectorate over the country. In 1883 France enforced a claim of certain rights over the northwestern part of Madagascar by taking possession of several ports Rapidly extending its influence in spite of considerable reverses, it succeeded in establishing a protectorate over the island in 1885, and in 1896 reduced Madagascar to the rank of a French possession. The advance of France in Indo-China led to war with China in 1884, which resulted in the establishment of a French protectorate over Annam and

Tongking M Grévy was reelected in 1885, but resigned in 1887 He was succeeded by Sadi Carnot, in whose administration the Panama Canal scandal occurred, involving many prominent men and weakening the government

The Carnot administration, too, witnessed the most formidable of all the attempts made to overthrow the Third Republic This was the agitation fostered by the members of the Orleanist, Legitimist, and Bonapartist parties, under the leadership of General Boulanger (1888) For a time it seemed as if the Republic was fated to fall before a coup d'état Boulanger, however, lacked the requisite decision of character, lost his popularity, and ultimately fled the country As a result, there was a very strong reaction in favor of the government This growth of republican sentiment received an additional impulse in 1893, when the Pope urged the clergy to accept the Republic This was a great blow to the Royalists, whose chief strength has always lain in their connection with the church In 1894 President Carnot was assassinated at Lyons by an Italian anarchist and was succeeded by Casimir-Perier, who resigned in January, 1895, and was succeeded by Felix Faure In the administration of the latter and that of Emile Loubet (q v), who was elected President on the death of Faure in 1899, fell the celebrated Dreyfus case, which divided the nation into two hostile camps and for a time seemed to threaten the downfall of the Republic (See DREYFUS) The crisis was safely weathered under the able guidance of Waldeck-Rousseau (q v), who became Premier in 1899 He formed a cabinet containing representatives of all the radical parties, the Republicans of the Left, the Radicals, the Radicals-Socialists, and even the Socialists themselves, whose spokesman was Millerand (q v). His advent into the ministry was a striking indication of the growing strength of the Socialist party This cabinet of "reconcentration" or of "national defense," representing as it did greatly divergent political and economic principles, was held together by the sole necessity of defending republican institutions against the machinations of royalists and reactionaries who were striving to turn the army against the Republic The Dreyfus crisis had demonstrated that in the clerical influence the existing régime had one of its most formidable enemies, and the first year of the twentieth century witnessed in consequence the inception of a strong anticlerical government policy

The Associations Law of 1901 brought religious congregations under government supervision, and when Waldeck Rousseau retired in 1902 after the longest ministry since 1871 the anticlerical campaign was carried on with increased vigor by his successor, Combes (q v), who set himself the task of wresting the control of education from the religious congregations on the ground that the clerical schools devoted themselves to instilling into the minds of their pupils sentiments hostile to the Republic Indeed, with the accession of Combes the policy of 'national defense," initiated by Waldeck-Rousseau, came to take on aspects of repression

But though the Combes ministry fell in the early part of January, 1905, the Rouvier ministry, which succeeded, pledged itself to carry out its religious programme, which possessed the support of a majority of the nation The hostile attitude of the new Pope Pius X towards the policy of the Combes ministry had given rise to a demand for the total separation of the churches from the state and a bill to that effect had been introduced by Combes A somewhat more moderate measure was passed by the Chamber of Deputies on July 3, 1905 and by the Senate on December 6, and was promulgated three days later It suppressed the budgets of public worship and thus put an end to the Concordat established by Napoleon I in 1801–02, substituting instead a system of associations for religious worship receiving no aid from the state and subject to the general provisions of the law dealing with corporations See paragraph on *Religion* above

In 1891 France broke the isolation that had surrounded her since the Franco-German War by contracting an alliance with Russia, thus offsetting the importance of the Triple Alliance, and in 1897 it was formally announced that a treaty had been signed From 1899 to 1906 foreign affairs were in the hands of the astute diplomatist, Theophile Delcassé (q v) He strengthened the alliance with Russia, established cordial relations with Italy, thereby weakening the Triple Alliance, and crowned his labors with the Anglo-French Agreement of April 8 1904, whereby the two powers were brought into a close *rapprochement* In this agreement France abandoned its Newfoundland shore rights in return for a money compensation and territorial concessions in West Africa, and recognized the predominant position of Great Britain in Egypt in return for acknowledgment by the latter of the right of France to maintain order in Morocco and to assist the Moroccan government in improving the administrative, economic, financial, and military condition of the country The downfall of Russia in the Far East left France for a time without an open ally in Europe, and the opportunity was seized by Germany in 1905 to force the dismissal of Delcassé, whose policy of alliances the German government regarded as aimed against itself The Algeciras Conference, which met in 1906 to consider the situation in Morocco, decided that France should be given certain customs rights on the Algerian frontier, and Spain similar privileges in the Riff country An international police force was also provided for, but never organized Germany caused trouble, both in 1908 and in 1911, by protesting that the French sphere of influence was too extensive The situation in the latter year appeared decidedly dangerous, as Emperor William had sent a warship to Agadir to protect German interests, but through the firm policy of Raymond Poincaré, who had succeeded Caillaux as Premier, coupled with the strong support of England, France emerged from the controversy with her rights to Morocco once more admitted by Germany In return for this recognition France ceded to Germany 112,000 square miles of the French Congo By a treaty with the Sultan of Morocco in 1912 France secured a practical protectorate over that country, with the exception of the northern fringe under the control of Spain

A feature of the French situation of the past decade has been the growth of industrial unionism (See SYNDICALISM) Many Socialists who were not in accord with the opportunist methods of Jaures, the Socialist leader, came into the ranks of the direct actionists The relation of the government to these unions has been a prominent factor in government policies and politics. The postal employees declared a

strike in 1909, but were induced to go back to work A general railway strike occurred during the following year on government as well as on private lines and disorganized the railway system of France Premier Briand, himself a Socialist, summoned the strikers in their capacity as military reserves, and compelled them to man the roads under threat of military punishment This broke up the strike A profound change in domestic legislation was begun in 1910 by the passage of an Old Age Pensions Act

Premier Poincaré was elected President in 1913, and it was the general belief that the choice of this strong man would mark an increase in the powers of the President Poincaré was the leader of the party that was in favor of a firm foreign policy, accompanied by internal development Aiming to do away with excessive localism, the Moderates were strongly in favor of electoral reform providing for the election of deputies by the *scrutin de liste* (which makes the department and not the arrondissement the district which elects, rendering the deputies more widely representative than now), with provision for minority representation This proposal was opposed by the Radical Left, led by Clémenceau and Caillaux, as they believed it would augment the power of the clerical party

A plan to increase the size of the army was passed by the Barthou ministry, in August, 1913, providing for a return to the requirement of three years' military service with no exemptions A conference of the Left at Pau in October of that year attacked the militarist policy of the government and declared for two years' service, which had prevailed before the passage of the three years' bill The fall of the Barthou ministry, however, was not accompanied by a repeal of the act Both the Doumergue and Viviani ministries were more anticlerical than antimilitarist This was doubtless due to the influence of Clémenceau, who, though a member of the Left, was nevertheless an ardent supporter of the three years' clause Premier Viviani indeed declared that change in the three years' act was impossible until the proposed substitutes, such as military training among youths and the utilization of reserves, proved their efficiency

The disturbances, during the closing months of 1913, in Alsace-Lorraine, particularly at Zabern, fanned again the hostility between France and Germany The stationary condition of the population of France is significant when compared with Germany In 1911 the population was only 39,601,509, as compared with 27,349,003 in 1801 and 36,905,788 in 1876 The annual increase has lately been less than 0 2 per cent, while Germany had an average annual increase for the decade 1900–10 of 1 36 per cent This disparity was indeed one of the chief causes for the passage of the three years' service act For an account of events following the outbreak of the great War of 1914, see WAR IN EUROPE

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Revolution, Tested by Mirabeau's Career (Chicago, 1894) Valuable especially for the relation of the Revolution to European affairs are Sorel, *L'Europe et la révolution française* (Paris, 1892), and Sybel, *History of the French Revolution*, trans by Perry (London, 1867–69) The works of De Tocqueville, Louis Blanc, Taine, Mignet, and Arthur Young are also to be quoted in this connection For works relating especially to Napoleon, see NAPOLEON I On France in the nineteenth century the leading authorities are for external affairs, Viel-Castel, *Histoire de la restauration* (20 vols, Paris, 1860–78), for internal affairs, Haurianne, *Histoire du gouvernement parlementaire en France, 1814–1848* (ib, 1860–72), covering the period to 1830, Hillebrand, *Geschichte Frankreichs* (Gotha, 1877–79), to 1830, monarchical in tone but scientific, Delord, *Histoire du second empire* (Paris, 1870), Bulle, *Geschichte des zweiten Kaiserreichs und des Kongreichs Italien* (Berlin, 1890), Zévort, *Histoire de la troisième république* (Paris, 1898), a valuable scientific history, Coubertin, *The Evolution of France under the Third Republic*, trans by Hapgood (New York, 1897), id, *France since 1814* (ib, 1900), Anderson, *Constitutions and Other Select Documents Illustrative of the History of France, 1789–1907* (Minneapolis, 1908) Among the later works are Molinier, *Les sources de l'histoire de France* (Paris, 1901–06), Levrault, *L'Histoire de France* (ib, 1905), Seignobos, *Cours d'histoire* (ib, 1909), Olivier, *L'Empire libéral* (17 vols, ib, 1897–1909), Hanotaux, *Contemporary France* (4 vols, New York, 1909), Bracq, *France under the Republic* (ib, 1910), Vizetelly, *Republican France* (Boston, 1913), Sabatier, *France To-Day* (New York, 1913), Guérard, *French Civilization in the Nineteenth Century* (ib, 1914), Moreton Macdonald, *History of France* (ib, 1914), A Hassall, *France, Medieval and Modern* (Oxford University Press, 1918), Poincaré, *How France is Governed* (New York, 1919), A B Dodd, *Up the Seine to the Battlefields* (New York, 1920), A L Guérard, *French Civilization from its Origins to the Close of the Middle Ages* (New York, 1921), S S V Lauzanne, *Great Men and Great Days* (New York, 1921), E C Price, *Stories from French History* (New York, 1921), J Bridge, *History of France from the Death of Louis XI* (Oxford University Press, 1922) Consult also the names of persons, parties, places, etc, as LOUIS XIV, DANTON, GIRONDISTS, BRUMAIRE, NAPOLEON I, AUSTERLITZ, ALGERIA, COMMUNE, ETC See also POLITICAL PARTIES See SUPPLEMENT

FRANCE, fräns, ANATOLE (1844–1924) The assumed name of Jacques Anatole Thibault, a noted French critic, generally recognized as the most distinguished novelist, the most graceful humorist, the most mordant ironist, and the purest stylist of contemporary France His early work, *Poèmes dorés* (1873), the verse drama *Les noces corinthiennes* (1876, produced in 1902), and the humorous story, *Jocaste et le chat maigre* (1879), do not rank high, but *Le crime de Sylvestre Bonnard* (1881, often translated) is a charming idyl of child and scholar's life, full of genial irony that grows more caustic in *Balthasar* (1889), while in *La rôtisserie de la reine Pédauque* (1893) and *Opinions de M l'Abbé Jérôme Coignard* (1893) the story is little more than a veil for the expression of an epicurean skepticism A group of four stories, *L'Orme du mail* (1897), *Le mannequin d'osier* (1898, dramatized in 1904), *L'Anneau d'améthyste* (1898), *Monsieur Bergeret à Paris* (1900), frankly call themselves *Histoire contemporaine* and seek to reflect the thoughts of typical Frenchmen of culture All these and his other novels as well, e g, *Thais* (1890), *Le lys rouge* (1894), *Histoire comique* (1903), and his social drama *Crainquebille* (1903), are the work of an impressionist critic rather than of a creative talent, and his journalistic reviews, *La vie littéraire* (5 vols, 1888–93), as well as his philosophic *Le jardin d'Epicure* (1895), show more of the spirit of Renan than that of any other His most delightful confession probably best reveals the secret of his charm for the present generation "To be frank, the critic should say 'Gentlemen, I intend to speak of myself apropos of Shakespeare, Racine, Pascal, or Goethe'" And yet this quiet bibliophile, scholar, and virtuoso of French prose displayed the greatest courage when, braving the inflamed prejudice of the multitude, he defended the oppressed Dreyfus (q v) In other matters, also, he had the courage of his convictions, witness his championship of socialism in *Opinions socialistes* (1902), in *Sur la pierre blanche* (1905), and elsewhere In 1896 he was elected to the Academy Other of his works are *Histoire de doña Maria d'Ayalos et de don Fabricio* (1904), *L'Eglise et la République* (1905), *Le livre de mon ami, le livre de Pierre* (1905), *L'Ile des pingouins* (1908), *Vie de Jeanne d'Arc* (1908), *Les dieux ont soif* (1912), and *La révolte des anges* (1914) Most of his works have been translated into English and German Consult R Le Brun, *A France* (Paris, 1904), George Brandes, *Anatole France* (New York, 1908), P Stapfer, *Humour et humoristes* (Paris, 1911), C H Conrad Wright, *A History of French Literature* (New York, 1912)

FRANCE, INSTITUTE OF See INSTITUTE OF FRANCE

FRANCE, ISLE OF See MAURITIUS

FRANCE, JOSEPH (1787–1869). A French reformer, born in Lorraine He entered the army in 1815, obtained a commission in the West Indies, and in Martinique rose to the rank of colonel in 1834 From 1836 to 1846 he had supreme command of the military police in the island and endeared himself to the lower classes of the population and to the slaves in particular In 1841 he published *La vérité et les faits, ou l'esclavage à nu*, in which he set forth the cruelties of the colonists towards the negroes The Governor, fearing the effects of this work, removed France from his command and sent him a prisoner to Paris to stand trial for publishing seditious writings He lost his commission, but after the revolution of 1848 and the abolition of slavery in the colonies he was chosen to represent Martinique in the Constituent Assembly From 1852 until his death he was a member of the colonial council of Martinique Besides contributions to the *Revue Abolitionniste*, he published *Histoire de la Guadeloupe* (1885), *Les corsaires français dans les Antilles* (1857), *Histoire de la filibuste* (1860), *Questions coloniales* (1860), *Statistique physique et politique de la Martinique* (1861)

FRANCE, REFORMED CHURCH OF See HUGUENOTS

FRANCESCA, fran-chĕs'kä, PIERO DELLA (c 1420–92) A central Italian painter of the

Renaissance This form of the name, the traditional one, is most usual in contemporary documents and is to be preferred to Pietro de' Francesci, the form generally adopted by modern authorities (See Gronau, *Repertorium fur Kunstwissenschaft*, xxiii, 392–394) He was born at Borgo San Sepolcro, the son of a notary of influential family His work shows the influence of Paolo Ucello (q v.), and he was an assistant of Dominico Veneziano, probably at Perugia and certainly in 1439–40 in the frescoes in the chapels of Sant' Egidio and Santa Maria Nuova, Florence In 1451 he painted a fresco in the church of San Francesco at Rimini representing his patron, Sigismondo Malatesta, Lord of Rimini, kneeling before St Sigismond He was active at Ferrara and Bologna, and is said, upon an invitation to Rome by Nicholas V, to have painted two frescoes which were destroyed when Raphael painted the Stanze of the Vatican By 1466 he had finished his greatest work, the "Story of the True Cross"—a series of frescoes in the choir of San Francesco, Arezzo The "Story" begins with Adam, deals with Solomon and the Queen of Sheba, St Helena and Constantine, whose "Vision" is marvelously depicted, and Heraclius and Chosroes In 1469 Piero was at Urbino in the house of Giovanni Santi (q v) At this time he painted for Duke Federigo of Urbino the two remarkable portraits, now in the Uffizi, of the Duke and his wife Battista Sforza, with allegories on the reverse sides, the "Madonna" in the Brera; and the "Flagellation of Christ" in Urbino Cathedral According to a tradition preserved by Vasari, Piero became blind in his later life, which was probably devoted largely to his writings He was buried in the cathedral of San Sepolcro in 1492 Other important frescoes by him are "St Louis of Toulouse" (1460) and the "Resurrection," in the town hall of Borgo San Sepolcro, "Hercules," in the Gardner collection, Boston, and a "Magdalen" in the cathedral of Arezzo. His other important panel pieces include a "Baptism of Christ" and "Nativity" with remarkable light effects, in the National Gallery, London, an "Annunciation," in the Gallery of Perugia," "St Thomas Aquinas," in the Poldo Pezzoli collection, Milan, and an early "Triumph of Chivalry," in the Gallery of the New York Historical Society Piero was the greatest of the Realists of the fifteenth century, whose achievements made possible the brilliant later development His was especially the determinative influence in central Italian painting The equal of the best Florentines in draftsmanship, he was their superior in color, and he was the first Italian painter to master light and atmosphere. His figures are well modeled—solemn and impassive in expression, and rendered with thorough objectivity He was also a theorist and scientist of note His treatise *De quinque Corporibus* shows him a learned geometrician, and his *Prospettiva pingendi*, a manual on perspective, is the most remarkable of its day His principal pupils were Melozzo da Forlì and Luca Signorelli (qq v). The most scholarly biography of Piero della Francesca is by Witting (Strassburg, 1898), others are by Pici (Borgo San Sepolcro, 1893), Waters (London, 1901), and Ricci (Rome, 1910)

FRANCESCA DA RIMINI, dä rē'mē-nē (?–c 1288). The daughter of Guido da Polenta, the Lord of Ravenna She was given by him in marriage to Giovanni, sometimes called Gianciotto, or Sciancato (the Lame), the son of Malatesta, the podestà of Rimini Malatesta was a Guelph leader who had made himself the master of all the region about Rimini He had, besides Giovanni, a son, Paolo, called the Handsome, whom Giovanni sent to Ravenna to bring back his bride Francesca and Paolo fell in love, and Giovanni, finding them together, killed them both (c 1288) The tale has many modifications, but this is the simplest outline of the story Aside from Dante's famous lines in the *Inferno* (v, 72–142), it has been treated repeatedly in literature and art The best known of the pictures are Paolo and Francesca," by Ingres (1819), in the Chantilly Museum, Ary Scheffer (1835), in the Wallace collection, G F Watts (1879), and the "Death of Paolo and Francesca," by Cabanel (1870), in the Luxembourg Leigh Hunt made this story the subject of a poem (1816), Silvio Pellico wrote a tragedy on it (1818), G H Boker made an acting version (1864), Paul Heyse treated it dramatically (1850), Stephen Phillips produced a dramatic poem (1899), the Italian poet D'Annunzio a drama (1901), G Cesario, a tragedy (1906), and the Bohemian Nernda, a tragedy (1909) There is an opera of this name by Hermann Gotz (1877), which was completed by E Frank, a symphonic poem for orchestra by Tschaikowsky (1877), and an opera by Ambroise Thomas, *Françoise da Rimini* (1882) Consult· Yriarte, *Françoise da Rimini, dans la légende et dans l'histoire* (Paris, 1882), Tornini, *Memorie storiche intorno a Francesco da Rimini* (Rimini, (1870), *De Sanctis in Nuova Antologia* (Florence, 1869), Ricci, *L'Ultimo rifugio di Dante* (Milan, 1891) For an exhaustive bibliography on the subject, consult Mazzolini, *Atte dell' Ateneo*, vol xvi (Bergamo, 1901)

FRANCESCHINI, fran'chēs-kē'nē, BALDASSARE (1611–89). An Italian painter of the Florentine school He was born at Volterra, whence he is also called Volterrano Giuniore, to distinguish him from Daniele da Volterra He was a pupil of Matteo Rosselli and Giovanni di San Giovanni in Florence and afterward studied the antique in Rome He was a very facile painter and possessed exceptional knowledge of foreshortening and perspective, but, like the rest of the Mannerist group, was deficient in technique and in sentiment His works are principally in Florence, where he painted four large paintings of the deeds of the Medici in the Ducal Palace, and frescoes in several churches, including Santa Maria Maggiore and Santissima Annunziata and at Volterra, especially in the convent of Santa Badia di San Giusto His masterpiece is the "Coronation of the Virgin," in Santissima Annunziata, Florence He is represented in the Pitti and Uffizi, in the Metropolitan Museum, New York, and in the Walters Gallery, Baltimore, by a "Madonna and Child"

FRANCESCHINI, fran'chēs-kē'nē, MARCANTONIO (1648–1729) An Italian painter, born at Bologna. He studied under Galli and was the pupil and friend of Carlo Cignani and worked with him at Bologna, Modena, Reggio, and elsewhere One of his greatest paintings, a fresco at the Council Palace in Genoa, representing scenes from the history of the Republic, was destroyed Others of his large decorative works are frescoes in the Pallavicini and Durazzo palaces in Genoa, a ceiling in the Ranazzi Palace in Bologna, and the "Death of St. Joseph" and other paintings in the Corpus

Domini church, Bologna In 1711 he designed for Pope Clement XI several cartoons for mosaics in St Peter's, Rome, and he was also invited to Vienna, where he painted frescoes in the Lichtenstein Palace Franceschini was in many ways a remarkable artist, he had a genius for composition, and all that was mannered and artificial in his imitators was redeemed in him by the fertility of his imagination and the warmth of his color His easel pictures include "The Annunciation," Bologna Gallery, "Birth of Adonis" and "The Magdalen," Dresden Gallery, "San Carlo Borromeo Helping the Plague-Stricken" and "Charity," in the Vienna Gallery

FRANCESCI, PIETRO DE See FRANCESCA, PIERO DELLA

FRANCESCO DI PAOLA, fran-chĕs'kō dē pa'ō-la See FRANCIS OF PAOLA

FRANCHE-COMTÉ, fransh' kōn'tā' (Fr, free county) An old province in the east of France, in the basin of the Rhône, comprising what now forms practically the departments of Doubs, Haute-Saône, and Jura, and part of the Department of Ain It was inhabited in ancient times by the Sequani and was the Maxima Sequanorum of the Romans In the fifth century it was conquered by the Burgundians and later formed part of the Frankish monarchy It passed afterward through various hands, until in 1156 it came into the possession of the Emperor Frederick Barbarossa In 1384 it was annexed by Philip the Bold of Burgundy Through the marriage of Mary of Burgundy to Maximilian, Franche-Comté became a possession of the Hapsburgs, and, together with the Netherlands, it passed to the Spanish branch of that house and was confirmed by the Peace of Westphalia (1648) The acquisition of the region was one of the chief objects of Louis XIV's external policy, his armies overran the province in 1668 and 1674, and he was confirmed in his conquest by the Treaty of Nimeguen (1678) The name first appears in the twelfth century, and indicates freedom from Imperial taxation, except the annual gift to the sovereign of a stipulated sum Louis XIV did away with this custom, however Among the famous sons of the Franche-Comté are Cuvier, Rouget de l'Isle, and Victor Hugo Its old capital was Besançon

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FRANCHETTI, frăn-kĕt'tē, BARON ALBERTO (1860–) An Italian operatic composer, born at Turin He was a pupil of Nicolò Coccon and Fortunato Magi Proceeding to Dresden, he studied under Draeseke, after which he entered the Munich Conservatory. He belongs to the new school of Italian composers and is regarded as one of its most successful exponents His principal and most important opera was the four-act drama legend *Asraele,* produced in 1888 Other and scarcely less successful operas are *Christoforo Colombo* (1892), *Fior d'Alpe* (1894), *Il signor di Pourceaugnac* (1897), *Germania* (1902), *La figlia di Jorio* (1906) He also wrote many smaller works, the best of which is a symphony in E minor

FRANCHEVILLE, fransh'vĕl', or **FRANQUEVILLE,** frăNk'vĕl', PIERRE (1548–c1618). A French sculptor, born at Cambrai. Against his parents' wishes he went to Paris in 1564 to study art, and, recalled home to follow a literary career, left his country secretly, making his way to Germany and Austria At Innsbruck, where he was apprenticed to a wood carver for five years, he found a patron in the Archduke Ferdinand, who enabled him to study under Giovanni da Bologna at Florence He assisted that famous master in many of his works In 1574 he modeled a number of statues for Villa Rovezzano, near Florence, and in 1585 he went to Genoa, where the colossal figures of Jupiter and Janus in the Grimaldi Palace, and the statues of St Ambrose, St Stephen, and "The Four Evangelists," in the cathedral, bear witness to his proficiency The rapidly increasing reputation acquired by such works as the "Allegorical Figures of Humility, Chastity, and Wisdom," in the Nicolini Chapel at Florence, led to his being sent to Pisa to assist Giovanni da Bologna in modeling the doors of the cathedral, and afterward to his being summoned to Paris by Henry IV who appointed him court sculptor In that capacity he executed numerous statues, busts, and vases for the royal palaces and gardens Prominent among these are "David with the Head of Goliath" (1612), "The Conquered Nations' (1614), four figures, formerly part of the equestrian monument of Henry IV, and "Orpheus"—all in the Louvre, and the groups of "Time and Truth" and "Saturn and Cybele," in the Tuileries Garden His work is somewhat cold and dry, but he was a man of great versatility and also active as an architect, painter, and writer

FRANCHI, fran'kē, AUSONIO (1821–95). The pseudonym ("free Italian") of Cristoforo Bonavino, an Italian philosopher, born at Pegli, near Genoa He was ordained a priest, but abandoned this career and gave himself to the study of philosophy, under the name of Franchi, by which he was always known He became professor at the University of Padua in 1860 and at the Academy of Milan in 1863 Among his works are *La filosofia delle scuole italiane* (1852), *La religione del secolo XIX* (1853), *Del sentimento* (1854), *Il razionalismo del popolo* (1862), *Saggi di critica e polemica* (1871), *Lettere su la teorica del giudizio* (1870), *Ultima critica* (1890–93)

FRANCHI, FABIAN and LOUIS DEI In Boucicault's drama *The Corsican Brothers,* the twin brothers whose mysterious sympathy is the basis of the play

FRANCHISE, frăn'chīz. In English law, as defined by Blackstone, a royal privilege, or branch of the crown's prerogative, subsisting in the hands of a subject. Being derived from the crown, franchises must arise from royal grant, or in some cases may be held by prescription, which presupposes a grant The subjects of franchise correspond with what in Scotland are called regalia (q v). The right to take waifs, estrays, wrecks, treasure-trove, royal fish, and forfeitures, all of which are the prerogatives of the crown, are franchises The rights of forest, chase, park, warren, and fishery are also franchises, no subject being entitled so to apply his property for his own convenience A county palatine (see PALATINATE) is the highest species of franchise, as within it the earl, constable, or other chief officer may exercise without control the highest functions of the sovereign And as the crown may thus erect an entire county into an independent jurisdiction, so it may

create a liberty of bailiwick independent of the sheriff of the county, and bestow the privilege as a franchise It is likewise a franchise for a number of persons to be incorporated, and subsist as a body politic, with a power to maintain perpetual succession and do other corporate acts, and each individual member of such corporation is also said to have a franchise or freedom The right to hold a fair or market, or to establish a ferry and to levy tolls therein, is also a franchise Where the holder of a franchise is disturbed in his right he may sue for damages by an action on the case, or in the case of nonpayment of tolls he has the remedy of distress (q v). Viewed as property, a franchise is an incorporeal hereditament (q v) When a franchise is granted on a valuable consideration, as in the case of a private corporation, it is in the nature of a contract between the government and the grantee and is protected from legislative interference in this country by constitutional provisions prohibiting the enactment of laws which impair the obligation of contracts (See DARTMOUTH COLLEGE CASE) On the other hand, the franchise is affected with a *jus publicus*, which secures to the state the power of regulating the conduct of a corporation and even of destroying it as punishment for any grave abuse of its privileges Serious problems have arisen in connection with the taxation of franchises, the question whether grants in perpetuity should be made, the effect of bribery in their procurement, and the extent to which there should be public ownership or control.

As a political term, franchise denotes the right of suffrage In England the qualifications of voters for members of Parliament are quite different from those of voters at municipal and other local elections In the United States the conditions of elective franchise are generally, though not always, the same for Federal, State, and municipal purposes See SUFFRAGE, and consult Pollock and Maitland, *History of English Law* (Boston, 1899), Kent, *Commentaries on American Law* (ib, 1896), Taylor, *Treatise on the Law of Private Corporations* (New York, 1902), Myers, *History of Public Franchises in New York City* (ib, 1900), Joyce, *Treatise on Franchises, especially those of Public Service Corporations* (ib, 1909), King, *The Regulation of Municipal Utilities* (ib, 1912)

FRANCIA, fran'cha (properly FRANCESCO RAIBOLINI) (1450–1518) An Italian painter and goldsmith of the early Renaissance, the chief master of the early Bolognese school of painting (q v) He was born at Bologna, the son of a carpenter, and until his fortieth year practiced the goldsmith trade In this he achieved high distinction, having been repeatedly steward of the goldsmiths' guild and in 1514 steward of the Four Arts He was famous as a medalist and as a worker in niello Two charming niello plates at the Academy of Bologna are ascribed to him, as is also a small relief portrait of Giovanni II Bentivoglio in San Giacomo Maggiore. The ruling house of Bentivoglio named him master of the mint, and upon its expulsion Pope Julius II confirmed him in this office

Francia's earliest dated paintings (1494) show the influence of Lorenzo Costa, who was then at Bologna, and who probably taught him painting The metallic character of his first pictures and their strong outlines point to his former profession. But Francia soon outgrew his colleague, both in color and in drawing, although Costa was more imaginative and dramatic There also appears in his works a sentiment reminiscent of the Umbrian masters Among his earlier paintings are a "Holy Family," in the Museum of Berlin, and a dead 'St Stephen," in the Borghese Palace, Rome The Pinacoteca of Bologna has a fine "Madonna Enthroned," (1494), his earliest-dated work, and a "Dead Christ", the Brera (Milan), an "Annunciation" the Louvre, a "Crucifixion," originally in San Giobbe, Bologna, Berlin, a "Madonna and Six Saints" (1502) The "Virgin in a Rose Garden Adoring the Christ Child," in the Munich Gallery, a picture of highest poetic charm, is, without any doubt, his masterpiece Another fine example of his work is the Bentivoglio altarpiece in San Giacomo Maggiore, Bologna

The chief claim of Francia's paintings consists in a peaceful, lyric sentiment and in the dainty loveliness of the landscapes This is especially true of his earlier works They indeed lack composition—a defect remedied in his less attractive later works, painted under the influence of Raphael The reputed correspondence between Francia and Raphael and Francia's sonnet to the master are forgeries of a later date, but Francia may well have seen works of Raphael at Bologna Among the works showing the influence of Raphael are the "Virgin Enthroned," in the National Gallery, London the "Coronation of the Virgin," in the cathedral of Ferrara, and the "Assumption of the Virgin," in San Frediando, Lucca Other examples are the "Deposition from the Cross," in the Parma Gallery the "Adoration of the Kings," at Dresden, and a "Madonna" in the Gardner collection, Boston, and a head of the "Virgin," in the Philadelphia Academy of Fine Arts His frescoes in the Oratory of Santa Cecilia, Bologna representing the "Marriage of the Saint with St Valerian" and her "Burial," are among the finest of his works. He died at Bologna, Jan 5, 1518

Francia's sons, GIACOMO (died 1557) and GIULIO (1487–1543), painted in their father's manner, but were much inferior to him They worked together, signing their works J. J. Francia, and examples of their joint efforts exist in the galleries of Bologna, Parma, and Berlin Giacomo, who was the better painter, subsequently came under the influence of Dosso Dossi (q v.) Specimens of his independent work are in the Museum of Berlin, the churches and Gallery of Bologna, and in the Brera, Milan

Consult. Cartwright, *Mantegna and Francia* (London, 1881), Morelli, *Italian Painters* (ib, 1892–93), and the monographs by Williamson (ib, 1901) and Lipparini (Bergamo, 1913), also Carmichael, *Francia's Masterpiece* (London, 1909)

FRANCIA, fran'sē-ä, JOSÉ GASPAR RODRÍGUEZ (c 1757–1840) Dictator of Paraguay. He was born at Asunción and was the son of a small landed proprietor of Portuguese origin. He studied theology at the University of Córdoba de Tucumán, taking the degree of D D Later he turned to law and gained considerable distinction as a jurist and public official, becoming popular because of his advocacy of the rights of the lower classes. Refusing to join Buenos Aires in the revolutionary movement, in 1811 Paraguay joined the Liberal cause and declared her own independence. Francia took

a leading part in the revolution and was made secretary of the government Junta He was the one man of ability among an ignorant population and was so hampered by his colleagues that he resigned his position, only to come forward into still greater prominence when the incapacity of the governing body had precipitated a counterrevolution In 1813 Francia and General Fulgencio Yegros, a man of little intellect and energy, were appointed consuls The next year they were granted a temporary dictatorship of three years, but soon after Yegros was forced out by Francia In 1816 Francia was made Dictator for life by Congress, which was immediately dissolved For the next 25 years he was the sole ruler of Paraguay Solitary and mysterious, his motives are little known, and he is usually considered as a bloody despotic tyrant, but his acts hardly indicate that he was moved solely by selfish interests and ambitions He was the government, ruling in secret, yet under his sway the condition of Paraguay rapidly improved The extraordinary system of nonintercourse with other nations which he enforced benefited Paraguay in diversifying her industries and forcing her farmers to develop the resources of the soil to the utmost in order to supply the home market Francia introduced schools, repressed superstitious observances, and enforced strict justice in the courts, but he kept his subjects in a state of cruel bondage, being known to them as "El Supremo" (the supreme one), and living in perpetual fear of assassination Rengger and Longchamp, two Swiss surgeons whom Francia held as prisoners from 1819 to 1825, gave an account of the Dictator in their *Essai historique sur la révolution de Paraguay et le gouvernement dictatorial du docteur Francia* (Paris, 1827) Consult Robertson *Letters on Paraguay* (London, 1838), *Francia's Reign of Terror* (ib, 1839), *Letters on South America* (ib, 1843)

FRANCIABIGIO, fran'cha-bē'jō (an abbreviation of Francesco di Cristofano Bigi) (1482–1525) A Florentine painter, of the high Renaissance He was a pupil of Piero di Cosimo and Albertinelli (q v), but was influenced to a far greater extent by Andrea del Sarto, with whom he lived and worked. Among the works of his early period, showing the influence of Albertinelli, are the "Annunciation," in the Turin Gallery, the "Virgin with Job and St. John" and "Calumny," after Lucian's description of a picture by Apelles, both in the Uffizi (Florence), the "Madonna del Pozzo,' in the same gallery, usually ascribed to Raphael, has also been attributed to him He assisted Andrea del Sarto in most of his frescoes Among their joint works was a series representing the "Life of the Virgin," in the cloister of the convent of the Servites (Santissima Annunziata), Florence One of this series, the "Marriage of the Virgin," is Franciabigio's best work, although mutilated by the artist himself, who was enraged at its premature unveiling by the friars Of the series of frescoes of the "Life of John the Baptist," in the convent dello Scalzo, he executed two 'Departure of John for the Desert" and "Meeting of John and Jesus" He also painted a fresco of the "Last Supper" at La Calza, and the "Triumph of Cicero" at Poggio a Caino, near Florence Among his other canvases are the "Temple of Hercules," in the Uffizi, and the "Story of Bathsheba" (1523), at Dresden His paintings are fine in color and excellently modeled, but he is at his best in his portraits of young men, which show marked individuality There are fine specimens in the Pitti Palace and the Louvre, besides others in the Berlin Museum (1522) and the National Gallery, London, and one at Windsor Castle, which is usually ascribed to Andrea del Sarto

FRANCILLON, fran'sē'yôn' The title of a play by the younger Dumas

FRANCILLON, frăn'sĭ-lon, ROBERT EDWARD (1841–) An English journalist and novelist He was educated at Trinity Hall, Cambridge, and was admitted to the bar in 1864 From 1872 to 1894 he was on the staff of the London *Globe* His first novel, *Grace Owen's Engagement*, appeared in *Blackwood's Magazine* in 1868 Among his many other books are *Olympia* (1874), *A Dog and his Shadow* (1876), and, between the last-named date and 1913, *King or Knave, Jack Doyle's Daughter, Ropes of Sand, Gods and Heroes*, and *Rose Maiden* (a cantata, music by F H Cowen, 1911)

FRANCIS I (1708–65) Holy Roman Emperor from 1745 to 1765 He was the son of Leopold, Duke of Lorraine, and in 1729 succeeded his father in the duchy In 1735 he ceded Lorraine to Stanislaus Leszczynski, father-in-law of Louis XV, to revert after his death to the crown of France, obtaining in return the succession to the Grand Duchy of Tuscany, whose native rulers, the Medicean family, were almost extinct In 1736 he married Maria Theresa of Austria, the only daughter and heiress of the Emperor Charles VI, and in the following year became Grand Duke of Tuscany In 1740 Charles VI died, and Maria Theresa succeeded him as ruler of the Austrian possessions She made her husband coregent with herself, but gave him little share in the administration In the wars carried on against Frederick the Great, Francis took little personal share In 1745 he was elected Holy Roman Emperor and was crowned at Frankfort, October 4 The famous Seven Years' War (1756–63) now broke out between Austria and Prussia, but the cares which it imposed fell mainly upon the great-hearted Maria Theresa, while Francis chiefly concerned himself with amassing a huge private fortune He died Aug 18, 1765, at Innsbruck His son Joseph succeeded him in the Imperial dignity, but Maria Theresa retained in her hands the sovereignty of the Austrian dominions till her death (1780) Consult Seyfart, *Leben Franz' I* (Nuremberg, 1766), Arneth, *Geschichte Maria Theresias* (Vienna, 1863–79), R Waddington, "La Guerre de Sept Ans," in *Histoire diplomatique et militaire*, vols i–iv (Paris, 1899–1907)

FRANCIS II (1768–1835) Holy Roman Emperor from 1792 to 1806, and ruler of the Austrian dominions from 1792 to 1835 (with the title of Emperor of Austria from 1804) He was the eldest son of the Emperor Leopold II and of Maria Louisa, daughter of Charles III, King of Spain, and was born at Florence, Feb 12, 1768 In 1790 his father, previously Grand Duke of Tuscany, became Emperor on the death of his brother Joseph, and dying March 1, 1792, was succeeded in the hereditary Austrian dominions by Francis, who in July was elected to the Imperial throne of Germany. His reign began at a time when the progress of the French Revolution was exciting the alarm of the Old European dynasties. Austria was in alliance with Prussia against the Republic, and the allied

armies invaded France, but were driven back In 1794 the French arms carried all before them in Belgium In 1795–96 the war between France and Austria raged fiercely on German soil In 1796 Bonaparte swept through northern Italy, and in 1797 Austria was invaded Francis was forced to conclude the Treaty of Campo Formio Oct 17, 1797, by which Austria surrendered Belgium and Lombardy, receiving in return most of the dominions of the extinguished Republic of Venice Two years afterward Francis, in alliance with Russia and England, again took up arms and was at first successful, but the recall of the Russian general, Suvaroff, and the return of Bonaparte from the East turned the tide The victories won by Bonaparte at Marengo and by Moreau at Hohenlinden broke the power of Austria, and Francis was compelled to sue for peace By the Treaty of Lunéville in 1801 France was confirmed in the possession of the left bank of the Rhine In 1804 Francis assumed the title of Emperor of Austria In 1805 he entered into a new alliance with Russia, but the contest with France ended more disastrously than ever for the Austrians The French victory at Austerlitz completely humiliated Francis, who, at the Peace of Pressburg, in December, 1805, was obliged to surrender the Venetian territories and Tirol The Holy Roman Empire was now dissolved, after lasting for 1000 years, and Francis was henceforth known as Emperor of Austria and King of Bohemia and Hungary In 1809 he recommenced the war with Napoleon The battle of Aspern or Essling was an Austrian victory, though not a decisive one, but Napoleon triumphed again at Wagram, and dictated terms of peace from the palace of Schonbrunn in October of the same year, wresting from the Hapsburgs a large portion of their ancient hereditary territories In 1810 the French Emperor married the daughter of Francis, Maria Louisa, and gained a respite. During this time he studied the situation of Europe and under the guidance of Metternich (q v) joined the Russians and Prussians against France in 1814. Immediately after the first abdication of Napoleon the Congress of Vienna was assembled for the reconstruction of the political system of Europe (See AUSTRIA-HUNGARY) Francis joined Alexander I of Russia and Frederick William III of Prussia in the formation of the Holy Alliance (q v), and the reactionary and absolutistic ideas embodied in that contract characterized the policy during the remainder of his reign Francis died on March 2, 1835 Consult Baron J A Helfert, *Kaiser Franz und die osterreichischen Befreiungs-Kriege* (Vienna, 1867), and Meynert, *Franz I* (ib , 1871–73)

FRANCIS I (1494–1547). King of France (1515–47) He was the son of Charles, Count of Angoulême, and was born at Cognac, Sept 12, 1494 At the age of 20 he married Claude, daughter of Louis XII, and succeeded his father-in-law Jan 1, 1515 He immediately entered upon the task of reconquering Milan, which had been wrested from his predecessor two years before At the head of 40,000 men Francis crossed the Alps and attacked the Swiss allies of the Milanese at Marignano, completely defeating them with a loss of 12,000 men, Sept 13 and 14, 1515 On the field of battle Francis accepted knighthood from the renowned Bayard After some further successes he returned to Paris in 1516. On the death of the German Emperor Maximilian in January, 1519, Francis I and Charles of Spain became rival candidates for the Imperial crown The election of Charles excited the anger of the French King, who immediately prepared for war and endeavored to secure the alliance of Henry VIII of England, but with no success, Henry instead forming an alliance with the Pope and the Emperor against Francis The forces of Francis I were driven out of Italy, the English and Imperialists invaded France, the Constable de Bourbon, who was discovered to be conspiring against his sovereign, fled to Charles, who gladly accepted his services An attempted invasion of Italy by the French failed, and the Imperialists advanced into Provence On the approach of the French King they withdrew into Italy, where they were followed by Francis, who overran Lombardy, but was totally defeated and taken prisoner at the battle of Pavia, Feb 24, 1525 Charles carried his captive to Madrid and only granted him his liberty on the hardest conditions He was forced to renounce the sovereignty of Flanders and Artois, the Duchy of Burgundy, and all his Italian possessions, to promise the restoration of the Constable de Bourbon to his former dignities, and to surrender his two sons as hostages Francis obtained his freedom March 17, 1526, but his first act, on his return to his dominions, was a refusal to fulfill the pledges he had given Pope Clement VII absolved him from his oath, England, Rome, Venice, Florence, and Genoa—all of whom were growing alarmed at the immense power of Charles—withdrew from the Imperial alliance and sided with his antagonist The war in Italy now recommenced On May 6, 1527, the Imperial forces of the Constable de Bourbon stormed and sacked Rome and captured the Pope. A French army under Lautrec was sent into Naples, but after a series of brilliant successes was almost wholly cut off by disease About the same time Francis sent a challenge to Charles to decide their quarrel by single combat The challenge was accepted, but the duel never took place Peace was concluded at Cambrai in August, 1529, to the great advantage of the Spaniards In 1536, however, war broke out again between the French and the Emperor, the French having overrun Savoy, to which Francis laid claim, and whose Duke was the ally of Charles V Finally, by the efforts of Pope Paul III, a truce was concluded for 10 years at Nice, between Charles and Francis, June 18, 1538 In point of fact, however, peace lasted only four years, and in 1542 the French King put into the field five different armies against the Emperor The battle of Ceresole, April 14, 1544, in which the French were completely victorious, partially wiped out the dishonor of the defeat at Pavia. Alliance with Turkey aroused the Christian powers. Charles V and Henry VII of England marched upon Paris, and Francis was compelled to make peace with the Emperor at Crespy, Sept. 18, 1544 The war with England continued till 1546 Francis died at Rambouillet, March 31, 1547. Gay and voluptuous, Francis was still capable of heroic impulses and acts of splendid generosity He was a generous patron of the artists of the Renaissance, several of whom were to be found at the French court Libraries, schools, and colleges were founded and learning encouraged

Bibliography Consult the general histories of Michelet, Martin, and Ranke. Consult also.

Paris, *Etudes sur François I* (Paris 1885), Mignet, *Rivalité de François I et Charles V* (ib, 1876), Capefigue, *François I et la renaissance* (ib, 1844), Pardoe, *The Court and Reign of Francis I* (London, 1849, New York, 1901) Cochrane, *Francis I and Other Historic Studies* (London, 1870), Coignet, *Francis I and his Times*, trans by Twemlow (ib, 1889), *Catalogue des actes de François I*, published by the Académie des Sciences Morales et Politiques (Paris, 1887–1907), J Wisu, *La politique orientale de François Ier* (ib, 1908), A C P. Haggard, *Two Great Rivals, François I and Charles V* (New York, 1910), W Heubi, *François Ier et le mouvement intellectuel en France* (Lausanne, 1913), H Lemonnier, vol v (Paris, 1903–04) of E Lavisse's *Histoire de France* gives a list of leading secondary authorities

FRANCIS II (1544–60) King of France from 1559 to 1560 He was the eldest son of Henry II and Catharine de' Medici and ascended the throne in his sixteenth year Weak in mind and body, he was merely a tool in the hands of the Duke of Guise and the Cardinal of Lorraine, whose ambition brought on disastrous civil wars. He married (1558) the famous Mary Stuart. Consult De la Barre-Duparcq, *Histoire de François II* (Paris, 1867), Ernest Lavisse, *Histoire de France*, vol vi by J H Mariéjol (ib, 1904), which contains a bibliography

FRANCIS IV, Duke of Modena (1779–1846) An Italian despot After the fall of Napoleon in 1814 he received the Duchy of Modena, which he governed thereafter in the harshest and most reactionary manner He instituted proceedings against all those suspected of the least taint of liberalism, filled Modena with spies, hindered education, and stifled all popular liberties Several of the Modenese Liberals, including Ciro Menotti (1798–1831), he caused to be executed, while hundreds of others were imprisoned or forced to flee the country Revolts broke out in 1831, but with the aid of Austrian troops he maintained his power and continued his persecutions and oppressions until his death

FRANCIS V, Duke of Modena (1819–75). An Italian despot He continued the tyrannies of his father, Francis IV. His rule began with uprisings in various quarters of his realm, especially at Massa and Carrara, where his troops massacred some of the inhabitants Forced to flee to Mantua during the revolution of 1848, he returned after the defeat of the Piedmontese, with Austrian assistance He suppressed all disturbances most rigorously and filled the prisons with political offenders After the defeat of the Austrians at Magenta he led his army against the victorious Piedmontese, but from 1860 to the end of his life he spent in retirement in Austria. Consult Bayard de Volo, *Vita di Francesco V* (4 vols, Modena, 1878–85)

FRANCIS I (1777–1830). King of the Two Sicilies from 1825 to 1830. He was the son of Ferdinand I In 1812 he was appointed Regent of Sicily by his father and proclaimed a constitutional government, but in the following year his father deposed him and dissolved the Parliament In 1816 Francis became Governor of Sicily and in 1820 Regent of Naples In 1825, on the death of his father, he ascended the throne He became at once a reactionary, and his reign was marked by corruption, cruelty, and subserviency to Austria Consult Nisco, *Il Reame di Napoli sotto Francesco I* (Naples, 1893)

FRANCIS II (1836–94) King of the Two Sicilies from 1859 to 1861 He was the son of Ferdinand II and followed his father's system in ruling with an iron hand He refused all liberal concessions in spite of the urgent demands of the Powers When Sicily, with the exception of Messina, had submitted to Garibaldi in the summer of 1860, he sought to pacify his people by the promise of manifold reforms and, failing to secure their good will, made strong but unsuccessful efforts to secure foreign intervention in his behalf After Garibaldi's entrance into Naples, September, 1860, the King fled to Capua and thence to the citadel at Gaeta After a short siege Gaeta surrendered, and the King took refuge on a French frigate Feb 13, 1861 His dominions were incorporated in the Kingdom of Italy, and he selected Rome as his place of residence Consult Nisco, *Francesco II, re* (Naples, 1891), and H R Whitehouse, *Collapse of the Kingdom of Naples* (New York, 1899) See Garibaldi, Italy

FRANCIS, Convers (1795–1863) An American Unitarian clergyman and writer He was born at West Cambridge, Mass, graduated at Harvard in 1815, and became a Unitarian minister at Watertown Lydia Maria Child, the philanthropist, was his sister Dr Francis became professor of pulpit eloquence at Harvard in 1842 He wrote a *History of Watertown* (1830), *Life of Rev John Eliot, the Apostle to the Indians* (1836), for Sparks's "Library of American Biography," and a *Life of Sebastian Rale* (1848), the Jesuit missionary Consult Newell, "Memoir of Convers Francis," in *Massachusetts Historical Society's Proceedings, 1864–65*

FRANCIS, David Rowland (1850–1927) An American merchant and Democratic politician, born in Richmond, Ky He graduated at Washington University, St Louis, in 1870, and became a clerk in a commission house, rising to a partnership In 1877 he founded the commission and grain firm of which he remained the head He was Democratic mayor of St Louis in 1885–89 and Governor of Missouri in 1889–93 In President Cleveland's second administration he was Secretary of the Interior (1896–97) He was president and special foreign representative of the Louisiana Purchase Exposition held at St Louis in 1904 In 1910 he was an unsuccessful candidate in the primaries for United States Senator

FRANCIS, James Bicheno (1815–92) An Amerian hydraulic engineer, who has been called "the father of modern hydraulic engineering" on account of his practical and experimental work for over half a century on the water-power developments which created the city of Lowell, Mass He was born at Southleigh, England, and began his engineering career at the age of 14 years, on harbor work for a railway of which his father was superintendent Two years later he was employed on the Grand Western Canal in England In 1833 he came to America and soon began work on the Boston and Providence Railroad, under an engineer named George W Whistler The next year Mr Whistler began the water-power developments at Lowell, with Francis as assistant On Mr Whistler's resignation, in 1837, Francis, then only 22 years old, became chief engineer for the proprietors of locks and canals on the Merrimac River From 1845 to 1884 he was both agent and chief en-

gineer, and from 1884 until his death he was consulting engineer to the company Besides building a great system of dams, canals, conduits, and water-power machinery, Francis did a vast amount of pioneer experimental hydraulic work, known the world over as the "Lowell hydraulic experiments" The results of these experiments were first published in 1855 They were republished, with new data, in 1868 and again in 1883 Of the various elements composing the water-power works built at Lowell under Francis, mention may be made of the Northern Canal, built in 1846–48 Besides his one great life work, Francis had a considerable consulting practice in the construction of dams, power plants, mill buildings, and in the application of power in mills He was elected a member of the American Society of Civil Engineers on its organization in 1852, president in 1881, and an honorary member in 1892, a few months before his death He contributed largely to the *Transactions* of that Society and to technical journals and wrote *The Strength of Cast Iron Columns* (1865), but his great work is the *Lowell Hydraulic Experiments* (3d ed, 1883)

FRANCIS, JOHN WAKEFIELD (1789–1861) An American physician of German and Swiss descent, born in New York He was graduated from Columbia College in 1809 and received the degree of M D from the College of Physicians and Surgeons, New York City, in 1811 He was professor of materia medica in the College of Physicians and Surgeons from 1813 to 1816, professor of the institutes of medicine from 1816 to 1820, professor of obstetrics from 1820 to 1826, and professor of obstetrics and of medical jurisprudence in Rutgers Medical College, New York City, from 1826 to 1830 He interested himself greatly in the Woman's Hospital, the State Inebriate Asylum, and kindred institutions With Dr David Hosack he published the *American Medical and Philosophical Register* (1810–14) Among his many works were *Use of Mercury* (1811), *Cases of Morbid Anatomy* (1814), *Febrile Contagion* (1816), *On Cholera Asphyxia* (1832), *Anatomy of Drunkenness* (1857), *Memoir of Christopher Colles, Old New York, or Reminiscences of the Past Sixty Years,* with a memoir of the author by H. T Tuckerman (1865).

FRANCIS, SIR PHILIP (1740–1818). An English epistolary writer, the reputed author of the *Letters of Junius* The son of the Rev Philip Francis, he was born in Dublin and was educated at St Paul's School, London In 1756 he obtained a place in the office of Henry Fox, then Secretary of State In 1758 he became secretary to General Bligh, whom he accompanied on the expedition against Cherbourg, in 1760 secretary to the Earl of Linnoul, Ambassador to Portugal, in 1761 amanuensis to Pitt, and in 1762 first clerk in the War Office In 1773 he was appointed a member of the Council of Bengal, with a salary of £10,000, and sailed for India the next year. He quarreled with Warren Hastings, by whom he was severely wounded in a duel. Returning to England in 1781, he entered Parliament three years later and took an active part in the impeachment of Hastings In his political opinions he was a decided and consistent Whig. He withdrew from Parliament in 1807. None of his known writings are of value There is considerable evidence indicating that he was the author of the *Letters of Junius* (q v) Consult Parkes and Merivale, *Memoirs of Sir Philip Francis* (London, 1867), *The Francis Letters* (2 vols, ib, 1901), ed by Beata Francis and Eliza Keary G B Malleson *Life of Warren Hastings* (ib, 1894), and Sir Leslie Stephen's excellent article on Francis in the twentieth volume of the *Dictionary of National Biography* (ib, 1889)

FRANCIS'CANS, ORDER OF (also called MINORITES, or LESSER BRETHREN) A religious order of the Catholic church, founded by St Francis of Assisi in 1209 It comprises the communities of men or women observing the rule of St Francis in some of its various forms They make up three divisions the first order, the Friars Minor, includes the male members, the second, those monasteries of cloistered nuns professing the rule of St Clare, and called the Poor Ladies, or Poor Clares, the third order, the Brothers and Sisters of Penance, both lay persons and certain religious congregations affiliated with the Franciscans (See TERTIARY) The Friars Minor, or first order, now has three divisions the Friars Minor, or parent body, founded in 1209, the Friars Minor Conventuals, and the Friars Minor Capuchins, which have grown out of it and were established as independent orders in 1517 and 1528 respectively. (For an account of the establishment of the order and its earliest years, see FRANCIS OF ASSISI, SAINT) The rule for the Friars Minor, drawn up by St Francis in 1209, was divided into 23 chapters, containing 27 precepts, binding the members to "observe the holy Gospel of our Lord Jesus Christ by living in obedience, without property and in chastity" The use of money is absolutely forbidden, and the quantity, quality, and value of clothing are prescribed The habit was to consist of a gray gown of coarse cloth, with a pointed head, or capuche, an undertunic and drawers, and a cord around the waist This costume resembled the dress of the shepherds of the day. The use of shoes and riding on horseback were prohibited Unnecessary conversations with women and the visiting of female monasteries without special dispensation were forbidden Fasts on all Fridays of the year were enjoined, as also during the periods from All-Saints to Christmas and from Epiphany to Easter The recitation of the Divine Office was also rendered obligatory Absolute obedience to superiors in all things not contrary to the rule was prescribed The order grew rapidly and spread throughout the various countries of Europe, until at the second general chapter, held at Assisi in 1219, within 10 years of its birth, more than 5000 brethren were present In less than half a century it reckoned some 33 provinces, in which there were over 8000 convents, with a membership of 200,000 Some idea of the extraordinary extension of this remarkable institute may be formed from the startling fact that, in the dreadful plague of the black death in the following century, no fewer than 124,000 Franciscans fell victims to their zeal for the care of the sick and for the spiritual ministration to the dying After the death of St Francis a modification of the rule was introduced by Brother Elias, his successor in the office of general of the order This innovation related to the interpretation of the nature and extent of the vow of religious poverty, whether the community could acquire the privilege of the right of property even in things of necessary use Those who adhered to the letter

of the rule denied the privilege of all right of property to the community, and contended that it was unlawful for the order to acquire or retain a right of property in houses, convents, or even churches restricting its right in everything which it possessed to the simple use Out of this controversy arose divisions and subdivisions in the order The first broad distinction to which it gave rise was that between the Conventuals and the Observantines, the former living according to a mitigated interpretation of the rule and holding to the community's right of property, while they strictly adhered to the vow of poverty on the part of the individual, the Observantines, following the more rigid interpretation of the rule, deny the right of property in the order and live more in the manner of hermits, in low, mean dwellings, and according to the original rigor of the institute The latter were called Friars Minor of the Strict Observance In the course of time there arose among the Observantines themselves several reform movements, which gave rise to three branches that of St Bernardino of Siena in 1419, called the Reformed, then that of Blessed John de la Puebla and Blessed John of Guadalupe, under the name of Recollets in 1500, and, finally, the reform of St Peter of Alcántara in 1555, known under the name of Alcantarines

By a bull of Leo XIII, Oct 4, 1897, all these, however, were united under one head, a minister general, elected by the provincial ministers at a general chapter held every 12 years Several popes attempted to reconcile the differences between the Conventuals and the Observantines without avail Finally, in 1517, Leo X officially recognized the distinction between them, and in a bull promulgated that year gave the name of Conventuals to those who persisted in following the mitigated rule and in holding to the community's right of property Each body had its own general, but the minister general of the Observantines enjoyed preeminence and authority over the general of the Conventuals, who was obliged to obtain his confirmation from the former During the pontificate of Sixtus V the Conventuals sought in vain to free their head from this subordination and renewed the attempt in 1594 under Clement VIII with no greater success When they renewed their claim again under Urban VIII, the latter imposed silence upon them by a brief of April 21, 1631 In 1525 the reform among the Observantines that led to the establishment of the third branch, the Capuchins, was begun by Matteo di Bassi An immense number of persons desirous of practicing in the world the virtues of the cloister joined the third order, from the humblest to the highest station in life, notably among the latter in the thirteenth century were St Louis of France and St Elizabeth of Hungary In the course of time some tertiaries desirous of living in community, while conforming to the rules of the third order, formed communities in many parts of Europe which were affiliated with the general body as a branch distinct from the first and second orders

The head of the entire Franciscan body was to be chosen alternately (a regulation, however, which has not been observed) from the Cismontane and the Ultramontane families—a geographical division, the latter being those religious whose convents are situated in France, Spain, Lower Germany, Saxony, the islands of the Mediterranean, Africa, Asia, and the Indies in general, the former those in Italy, Upper Germany, Hungary, Poland, Syria, and Palestine Each family is again divided into provinces, by vicariates, or custodies Several custodies constitute a province under a common superior appointed by the general Some custodies are subject to a provincial, while others depend immediately upon the general The superior of the order has under his jurisdiction the Poor Clares and other Franciscan nuns The Poor Clares were founded by St Clare, the disciple and counselor of St Francis in 1212 A division over the strict observance of the rule of poverty established the Urbanist branch, who follow the less stringent rule allowed them by Pope Urban IV, Oct 18, 1263

The whole Franciscan Order (male) is divided into 12 circumscriptions, formed by 81 provinces, made up of 1413 convents and 17,000 friars The Poor Clares have 505 convents and 10,600 nuns The third order (secular) is spread all over the world and has a membership of about 2,500,000 The sisters (religious) professing the rule of the third order number about 50,000 The general of the Conventuals is called Master General of the Friars Minor Conventuals, the general of the Capuchins, Minister General of the Friars Minor Capuchins The third order has also a general of its own The order has given five popes to the church Nicholas IV, Alexander V, Sixtus II, Sixtus V, and Clement XIV, besides 54 cardinals, beginning with St Bonaventure It has given some celebrated theologians and philosophers to the ranks of the schoolmen St Bonaventure, Duns Scotus, Alexander of Hales, William of Occam Roger Bacon, famous as the experimental philosopher of the Middle Ages, was a Franciscan Friar The great Spanish statesman Cardinal Ximenes, two centuries later, was also a follower of St Francis Its historian, Father Luke Wadding, who published his elaborate *Annals* of the order in the seventeenth century, bears a deservedly high reputation In lighter literature, and especially poetry, St Francis himself is notable as a sacred poet Jacapone da Todi, the author of the "Stabat Mater," is one of the most celebrated mediæval hymn writers, Lope de Vega, the Spanish dramatist, closed his eventful career as a member of the third order Dante, it is believed from a passage in the *Divina Commedia*, was a Franciscan tertiary In the revival of art the Franciscan Order bore an active and enlightened part They may be said to have been the inspiring influence which gave rise in painting to the mystical school of Umbria, which in Perugino and Raphael attained the ultimate reach of Christian art Giotto and his successors, especially in fresco painting, were profoundly influenced by the Franciscan spirit In architecture the same spirit was potent in creating new types of churches in line with Cistercian models The Franciscans may be said to have imported into art a sentiment which before then had existed only in a crude state—seraphic love Their idealism and religious fervor did more perhaps than any other factor to exalt and spiritualize the art of the Middle Ages up to the time of the Renaissance

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FRANCIS DE SALES, *Fr pron* fraN'sĭs' de sal, SAINT (1567–1622) A distinguished saint and writer of the Catholic church He was of noble descent and was born at the Château de Sales, the seat of his family in Savoy He was the eldest son, and his father bestowed unusual care upon his education with the idea of fitting him for a worldly career in keeping with his station in life After spending his earlier years at the Collège de la Roche and the College d'Annecy, in the neighborhood of his home, he became a pupil, at 13 years of age, of the College Clermont at Paris under the direction of the Jesuit Fathers In 1584 he entered the University of Padua, where, at 24, he took his final degree with great distinction and became a Doctor of Laws But his inclination was for the church rather than for law His father at first opposed his wish to enter the priesthood, but in the end gave his consent Upon his ordination he was appointed provost of the diocesan chapter at the request of Monseigneur de Granier, Bishop of Geneva In 1594 the young priest was sent to the difficult mission of the Chablais, a province of Savoy, which had become Calvinistic His efforts for a long time proved fruitless, but in time he saw his labors repaid with numerous conversions, before his departure witnessing the restitution of all churches and of all ecclesiastical property in the Chablais to the diocesan clergy The government buttressed his efforts with law repressing Protestantism. Shortly after his return from the Chablais, at the solicitation of Monseigneur de Granier, Francis was made Coadjutor Bishop with the right of succession to the see of Geneva, and the succession followed in 1602 In that year the interests of the French division of the Geneva diocese took Francis to Paris Here Henry IV conceived a cordial liking for him As Bishop of Geneva, Francis was as indefatigable in his apostolic labors as when he was a simple priest His preaching was simple, fervid, and direct He carefully avoided the turgid ornament and rhetorical affectations common to the sermons of his century As a writer, St Francis de Sales has attained a wide popularity. His *Introduction to the Devout Life* has been translated into almost every language of Europe and has been more widely read than any other work on devotion with the exception of the *Imitation of Christ* His *Treatise on the Love of God* is his chief doctrinal work and shows more fully the comprehensive character of his mind His style is simple, lucid, and profusely illustrated It was under the spiritual direction of St Francis de Sales that Ste Jeanne de Chantal (see CHANTAL, JEANNE FRANÇOISE DE) founded the Congregation of the Visitation of the Virgin Mary in 1610 St Francis died at Lyons, on Sept 28, 1622 In 1665 he was solemnly canonized by Pope Alexander VII, and in 1877 he was declared one of the doctors of the church His works were published in Paris, 1861–62 and in more complete form, edited by Mackey, at Annecy, 1892 The *Love of God* has been edited by Strowsky (Paris, 1901, Eng trans, London, 1902), The *Canticle of Canticles* (New York, 1912), *Introduction to the Devout Life* (ib, 1913) For his life, consult C A de Sales (Chambéry, 1860), Camus, *The Spirit of Saint Francis de Sales* (New York, 1910), Lear, *Life* (London, 1882) also Guillot, *François de Sales et les protestants* (Geneva, 1873), Maxwell-Scott, *Saint Francis de Sales and his Friends* (St Louis, 1913)

FRANCIS FER'DINAND (1863–1914) Archduke of Austria-Este, the son of Archduke Charles Louis (1833–96), brother of the Emperor Francis Joseph He was born at Graz In 1875, on the extinction of the male line of Modena, he succeeded to the wealth of the family and to the title of Este The death of the Crown Prince Rudolph (1889) and of his own father made him heir apparent to the crowns of Austria and Hungary In 1900 he married the Countess Chotek, created Princess Hohenberg, after renouncing for her children the right of succession to the throne The Archduke wrote (1895–96) a description of his trip around the world in 1892–93 On June 28, 1914, he was assassinated with his wife at Serajevo, Bosnia, as the result of a political plot—the culmination of discontent because of the absorption of Bosnia into the Austro-Hungarian Empire. Riots followed the crime, and the Imperial and general European *status quo* was seriously endangered See WAR IN EUROPE

FRANCIS JOSEPH I (1830–1916) Emperor of Austria He was born Aug 18, 1830, at Vienna, the eldest son of Archduke Francis and a nephew of Ferdinand I Emperor from 1835 to 1848 Francis was taught the various languages of the heterogeneous Austrian monarchy In 1848 he served under Radetzky in Italy On Dec 2, 1848, amid the convulsions which threatened the dissolution of the Empire, the weak Emperor Ferdinand abdicated, his brother, the Archduke Francis, gave up his claims to the crown, and Francis Joseph, whose youth and popularity it was believed would make it easier to harmonize the conflicting interests of the monarchy, mounted the Austrian throne. Hungary was now in a state of open revolt, and in April, 1849, declared itself a republic with Kossuth as Governor In Italy Charles Albert of Sardinia again took up arms against Austria. Both in Hungary and Italy Austria triumphed, and the Emperor devoted himself to the reestablishment of his authority (See AUSTRIA-HUNGARY) In 1853 an attempt on his life was made by an Hungarian, but the Emperor escaped with a slight wound In 1855 a concordat was concluded with Pius IX, which restored to the Roman Catholic church through-

out the Empire many of the liberties of which it had been deprived since the hostile reign of the Emperor Joseph II In 1859 Francis Joseph was called to face a war with France and Sardinia, which ended with the loss of Lombardy After this war Francis Joseph abandoned his conservative policy and began the necessary work of reform, and after the disastrous Seven Weeks' War (q v) with Prussia, a reconstruction of the monarchy on a dualistic basis was effected by the *Ausgleich* of 1867 The abrogation in 1870 of the Concordat of 1855 antagonized the Pope Francis Joseph always strove to maintain a constitutional and parliamentary régime in his dominions He won the respect and affection of his subjects, and it was his personal influence that really held his dominions together under the most discouraging political conditions Francis Joseph married, April 24, 1854, Elizabeth, daughter of Duke Maximilian of Bavaria, who was assassinated by an Italian anarchist in Geneva, Sept 10, 1898 This marriage, the culmination of a genuine romance, ended in estrangement Elizabeth consented to appear on great ceremonial occasions, but she found relief, when the functions were over, in travel Her manner of life became that of a woman for whom life had nothing left except what converse with nature could afford The only son of Francis Joseph and Elizabeth, Rudolph, died mysteriously by violence in his hunting box at Meyerling The heir presumptive, Francis Ferdinand (q v), nephew of the Emperor, was assassinated with his wife June 28, 1914, at Serajevo, Bosnia This caused the rupture between Servia and Austria-Hungary which precipitated the great European war of 1914. (See WAR IN EUROPE) The new heir, Charles Francis Joseph, nephew of the slain Archduke and son of the late Archduke Otto, was born in 1887.

When Francis Joseph came to the throne, Austria was a Teuton power To-day it has only a small Teuton nucleus associated with a Magyar nucleus nearly as large, trying with it to assert predominant partnership in a large community of Slavs, and casting envious but not hopeful eyes towards the Balkan States and Ægean harbors Francis Joseph, the mainstay of the Triple Alliance (Austria-Hungary, Germany, and Italy), came to be regarded as the one indispensable man in the Empire, the one whose life must be prolonged at all hazards, lest his death cause the collapse of the structure he reared This feeling was intensified by the death of the Archduke Ferdinand

During the 60-year jubilee in 1908 an Imperial rescript annexing Bosnia and Herzegovina was issued, but even this act of aggrandizement did not diminish the enthusiasm of the people for Francis Joseph See AUSTRIA-HUNGARY

Consult J. Emmar, *Kaiser Franz Joseph* (2 vols, Vienna, 1898); J. Schnitzer, *Franz Joseph I und seine Zeit* (2 vols, ib, 1899), Virilis Unitis, *Das Buch vom Kaiser*, with introductions by J A v. Halfeit, ed by M Herzig (ib, 1898), R Rostok, *Die Regierungszeit des K u K Franz Joseph I* (3d ed, ib, 1903), *Die Thronreden Sr Majestat des Kaisers Franz Joseph I* (ib, 1908), H Brentano, *Kaiser Franz Joseph I, 1848–1908* (ib, 1908); R P Mahaffy, *Francis Joseph. His Life and his Times* (London, 1908), H de Weindel, *François Joseph intime* (Paris, 1905), id., *The Real Francis Joseph* (New York, 1909), Francis Gribble, *Life of the Emperor of Austria* (ib, 1913)

FRAN'CIS OF ASSISI, as-se'zē, SAINT (1181 or 1182–1226) The founder of the Order of the Friars Minor, or Franciscans He was born in the little town of Assisi, Italy His father was a rich merchant, named Pietro Bernardone, his mother, Pica, of the noble family of the Bourlemonts of Provence, a woman of piety and character The child's baptismal name was Giovanni (John), but his father, out of his predilection for France, with which he carried on an extensive trade, gave the boy the surname of Francesco (the Frenchman) Francis was taken into business partnership at the age of 14 by his father In his twenty-fourth year, after much meditation on the course of life he had been leading, he suddenly abandoned his old friends and haunts and embraced a life of rigid penance and utter poverty His object was to lead a life as nearly modeled upon that of Christ as possible and by absolute renunciation of the world to attain perfection Retiring to a grotto near Assisi, he gave himself up to penance and profound meditation on the sufferings of Christ In 1208, while hearing mass, he felt himself to be personally called to a mission and to poverty and went out to preach His austerities and his simple eloquence attracted attention, and it was not long before others, awakened by his ardent example, sought to follow in his steps and join themselves to him in his austere mode of life His first companions were fellow townsmen—Bernard of Quintavalle, a rich and noble layman, and Peter of Catana, a canon of the cathedral Here was the nucleus of the Franciscan Order It was not the intention of St Francis in the beginning to found a new order But others associating themselves with the three companions, until there were 12 all told in the band, St Francis drew up a rule of life in 23 chapters, which, besides the three ordinary vows, of poverty, obedience, and chastity, prescribed the express and absolute renunciation of every possession and the engagement to live upon alms As soon as the rule was drawn up (probably towards the close of June, or early in July, 1209), all betook themselves to Rome to seek the approval of the Pope Innocent III, then Pope, after some hesitation, approved the rule by word of mouth, made Francis superior-general of the Friars Minor, and conferred the diaconate on the founder, for Francis was as yet only a layman, and always, from motives of humility, refused to become a priest On their return to Assisi the Friars Minor established themselves in a little house adjoining the chapel of St Mary of the Angels, where he had received the great message at mass During the following two years the brethren occupied themselves with preaching and exhorting the people throughout the rural district around Assisi The order now grew rapidly, and in 1216 was solemnly approved by Innocent III Francis now sent missionary bands into the different provinces of Italy, then into France, Spain, and even Africa, to preach to the Moors He himself set the example of the missionary work of the order by going into the East Two years before his death St Francis, while in an ecstasy of prayer, is said to have received the marks (stigmata) of the wounds of Jesus upon his own person (See STIGMATIZATION) The scene of this event is laid on Monte Alverno, a lonely mountain near Assisi, and the date Sept 14, 1224 St Francis died at Assisi, Oct 3, 1226 He was canonized by Pope Gregory IX in 1228.

The works of St Francis have been frequently printed, by Horoy (Paris, 1880), in Latin, better by B da Fivizzano (Florence, 1880), Latin with Italian translation Consult the biographies written by Le Monnier (Paris, 1889, Eng trans, 1894), Paul Sabatier (ib, 1894, Eng trans by Houghton, New York, 1894), Knox-Little (London, 1897), Oesterly (ib, 1901), Adderley (ib, 1901), Stoddart (ib, 1903), Cuthbert (New York, 1912), Egan (ib, 1912), Joisengen (ib, 1912) Consult also Brother Leo of Assisi, *Saint Francis of Assisi, the Mirror of Perfection*, ed by Paul Sabatier, trans by Sebastian Evans (London, 1899), Duff Gordon, *The Story of Assisi* (ib, 1901), *Acta Beati Francisci et Sociorum Ejus* (St Louis, 1902), ed by Sabatier, Barine, *S François d'Assise et la légende de ses trois compagnons* (Paris, 1901), Carmichael, *The Lady of Poverty A Thirteenth Century Allegory* (New York, 1902) A bibliography is given in Robinson's *A Short Introduction to Franciscan Literature* (ib, 1907)

FRANCIS OF PAOLA, pa'ō-la, or **PAULA,** SAINT (1416–1507) Founder of the Order of Minimites He was born at Paola in Calabria At an early age he gave himself to a hermit's life, following the example of St Francis of Assisi, having no bed but bare rocks, and no other food than the herbs which he gathered in the neighboring woods or which were brought to him by his friends He was joined by some other enthusiasts, and the building of a chapel in 1436 is generally considered as marking the beginning of the Minimite Order (See MINIMITES) In 1474 the order was definitely confirmed by the Pope, and Francis appointed its first superior During the following years several new convents were founded in Calabria and Sicily, and the fame of Francis for sanctity and miraculous powers increased daily When Louis XI of France was alarmed by the approach of death, he sent to beg the intercession of Francis, who was unwilling to go to France until he was commanded by Sixtus IV He visited the King at Plessis-les-Tours and prepared him for death, holding him in his arms when it came Louis's son, Charles VIII, also had a great respect for him and built him a cloister in the park of Plessis and another at Ambroise He completed his rule in 1493, in three parts, for the brothers, sisters, and tertiaries He died at the convent of Plessis in 1507 and was canonized by Leo X in 1519 Consult his life by Ralland (Paris, 1874), and Ferraute (Monza, 1881).

FRANCIS XAVIER, zăv'ĭ-ẽr, SAINT (1506–52) A celebrated Jesuit missionary, called, from the scene of his mission labors, "the Apostle of the Indies" He was the youngest son of one of the most distinguished families of Navarre and was born near Pamplona in that kingdom, April 7, 1506 His early education was received at home, and in 1524 he was sent to the College of Saint-Barbe, in Paris, where he pursued studies in philosophy with so much distinction that at the age of 24 he became a lecturer in philosophy in the Collège Beauvais, at that time one of the most important in the university He attracted the attention of Ignatius Loyola, then an obscure student at the university, but already taken with the prospect of founding the Society of Jesus. Ignatius, on the lookout for suitable associates, became a close friend of Xavier's. The young professor's mind was intent on university distinction, but, realizing the vanity of his ambitions, he became one of the first members of the order that his Spanish compatriot was about to found (1534) He soon went to Rome in the interest of the new society During Xavier's stay in Rome John III of Portugal, anxious to extend the influence of Christianity to his immense Indian possessions, made a formal demand of the Pope for missionaries and asked especially for members of the new order Ignatius selected Bobadilla, but illness prevented his setting out, so Xavier was substituted for him, and after a single day for preparation began his journey to Lisbon At Lisbon, during the preparations for the voyage, he accomplished so much good that the King wanted to retain him at his capital But Xavier's heart was now bound up in the mission to India, and he sailed from Lisbon, April 7, 1541 He wintered at Mozambique and did not arrive in Goa until May 6, 1542

He found the lives of the European Christians in India so scandalous that it was useless to preach to the natives with such a perverse example under their eyes Accordingly he first took up the reformation of the foreign townspeople, and succeeded in awakening a spirit of exemplary penance and religious fervor Then he began his labors among the natives by preaching among the pearl-fishing population of the coast from Comorin to the island of Manar and on the coast of Ceylon After a little more than a year he returned to Goa, whence, with a fresh staff of assistants, he visited the Kingdom of Travancore. In the space of a single month here he baptized 10,000 natives Thence he passed to Malacca, where three other Jesuit missionaries, sent by Ignatius in compliance with Xavier's earnest solicitations, joined him His success among the dwellers on the coast region proved so encouraging that in 1546 he proceeded to the Banda Islands, to Amboyna, and the Moluccas Having effected an establishment of the gospel in many places, he now retraced his steps and revisited the scenes of his missionary labors At Malacca he met a Japanese, from whom he obtained information which filled him with desire for work in that country

After this he crossed to the island of Ceylon, where he converted the King of Kandy, with many of his people In May, 1548, he returned to Goa, to prepare for the conversion of the Japanese Empire A distinguished Japanese convert became a valuable auxiliary, and by his aid Xavier was enabled to acquire enough of the Japanese language to translate and explain the Apostles' Creed in it. His first success was insignificant, but before long the usual blessing attended his labors. The mission founded by him at Miako continued to flourish for more than 100 years, until the final expulsion of Christianity from the Japanese Empire After two years and a half in Japan he resolved to organize a mission to China At Malacca he tried to arrange with the Governor that an embassy should be sent in the name of the King of Portugal to China, by the help of which he hoped to gain an entrance for his mission He was not able to effect this, however Accordingly he took passage in a merchant ship to the island of Sancian, near Macao, which was at that time the trading port of the Chinese with merchants from Portugal Here, having obtained a Chinese interpreter, he hoped to induce some native merchant to land him secretly on

the coast His plan was baffled by the fears of the Portuguese, who dreaded that the Chinese authorities would punish this infraction of the law

Xavier's disappointment was keen For years his heroic zeal had tempted him to labors beyond his strength, and his sublime charity had exposed him to privations which had undermined his constitution He fell ill of fever, for which his attendants could find no means of relief. On the very threshold of what he looked forward to as the greatest opportunity of his missionary life, the saint passed away, on the island of Sancian, according to late biographers, Nov 27, 1552, though the date December 2 has always been given hitherto Many miracles were ascribed to him He was beatified by Pope Paul V in 1619 and canonized by Pope Gregory XV in 1622 His feast day was fixed upon December 3 His only literary remains are a catechism, some short ascetic treatises, and a collection of letters Of the letters there are translations in most of the modern languages

Consult Coleridge, *Life and Letters of Saint Francis Xavier* (London, 1872), Cros, *Saint François de Xavier, sa vie, son pays, sa famille* (Toulouse, 1900–01), *Monumenta Xaveriana* (Madrid, 1899–1900) For his work in Japan, see Carey, *A History of Christianity in Japan* (London, 1909), for that in India, Richter, *History of Missions in India* (New York, 1908).

FRANCK, frank, ADOLPHE (1809–93) A French philosopher, born at Liocourt, Meurthe, of Jewish parents He was educated at Nancy and Toulouse and became professor of philosophy at the College Charlemagne in Paris in 1840 In 1844 he was elected a member of the Academy of Moral and Political Sciences. He held the chair of Greek and Latin philosophy at the Collège de France from 1849 to 1852 and from 1854 to 1881 lectured there on natural law and the law of nations. He was one of the editors of the *Journal des Débats* and the founder of *La Paix Sociale*, the organ of the league against atheism Among his works are *De la certitude* (1847), *Dictionnaire des sciences philosophiques* (1843–52, new ed, 1875), of which he edited the greater part, *La kabbale* (1843, 9th ed, 1892, and in German version), *Le communisme jugé par l'histoire* (1849), *Etudes orientales* (1861), an attack on pantheism, *Philosophie et religion* (1867), *La religion et la science dans le judaisme* (1883), *Nouveaux essais* (1890), and, ed by Manuel, *Nouvelles études orientales* (1896)

FRANCK, CÉSAR AUGUSTE JEAN GUILLAUME HUBERT (1822–90) A French composer, born at Liége. After studying at the conservatory there he went to Paris, where he attended the Conservatory, studying under the organist Benoist and others He settled in Paris, and in 1872, at the Conservatory, succeeded Benoist, who retired after 50 years of service Meanwhile Franck had composed much, but found little recognition, though it is interesting, as indicating Liszt's breadth of judgment, that in the fifties chamber music by Franck was played in Liszt's private concerts at Weimar In 1846 Franck's oratorio *Ruth* was brought out at the Conservatory, but without success Yet 25 years later it was revived at the Cirque d'été, and the following year at the Conservatory, with such brilliant results that a "Franck cult" was instituted among the younger French musicians However, throughout the master's life the circle of his admirers was small, though select Only since the beginning of the present century has his real greatness been appreciated Franck is the direct successor of Berlioz, but surpasses him in fertility of invention and resourcefulness, except in the field of instrumentation As an instrumental composer, Franck cultivated both the classical forms—though frequently departing, especially in the development sections, from strict tradition—and the modern forms of Liszt and Berlioz His principal works are the oratorios *Ruth* (1846), *The Redemption* (1872), *Les Béatitudes* (1880), *Rebecca* (1881), a symphony in D (1889), the symphonic poems *Les Eolides* (1876), *Le chasseur maudit* (1884), *Les Djinns* (1884), *Psyché* (1888), a mass, two operas, *Hulda* (1885) and *Ghisele* (1889), important works for organ, and excellent chamber music Consult G Derepas, *César Franck* (Paris, 1897), E Etranges, *L'Œuvre lyrique de César Franck* (ib, 1897), F Baldensperger, *César Franck* (ib, 1901), V d'Indy, *César Franck* (ib, 1906), trans by R Newmarch (London, 1909), J Rivière *Etudes* (Paris, 1911)

FRANCK, frank, MELCHIOR (c 1580–1639) A German composer, born at Zittau He lived in Augsburg, where his first works were published in 1601 The following year he went to Nuremberg and in 1603 became chapelmaster at Coburg His best work is in sacred music, and some of his chorals are still sung He is one of the most prolific and interesting of the old German composers

FRANCK, SEBASTIAN (1499–1542) A German reformer and humorist, born at Donauworth Ordained to the Roman priesthood in 1524, he joined the Reformation shortly afterward, married in 1528, and, after some minor didactic works, published at Strassburg in 1531 his *Chronika*, one of the first German attempts at universal history Driven from Strassburg through the influence of Erasmus, he led a wandering and precarious life as a soap boiler, author, and printer, and in 1539 settled at Basel, where he died He appears to have been a pantheistic mystic, a forerunner of modern German idealism, of wide social sympathies and broad tolerance. His style is vigorous and clear —far superior to that of his time His collection of *Sprichworter* (1541) is edited by Guttenstein (1831), his *Weltbuch Spiegel und Bildnis des ganzen Erdbodens* (1534) is a geographical work of merit For his life, consult Weinkauff, in Birlinger's *Alemannia* (Bonn, 1877), Haggenmacher (Zurich, 1886), Tausch, *Sebastian Franck von Donauworth und seine Lehren* (Halle, 1893).

FRANCKE, frank'e, AUGUST HERMANN (1663–1727) A distinguished German educator and philanthropist, founder of the Francke Institutes (*Stiftungen*) at Halle He was born at Lubeck In the early years of his manhood his interests were primarily theological His orthodoxy was called into question, however, partly because of the envy caused by his extraordinary popularity as a preacher, and he was therefore unable to hold his position as lecturer at Leipzig While still a young man, his attention had been drawn to the unsatisfactory state of the German educational methods, and when, in 1695, he was called to assume the duties of pastor in a small town near Halle, he started a private school in his own house The school grew rapidly, and Francke found it necessary to

rent a building to accommodate it In connection with it he founded a school for the children of well-to-do parents, and in 1697 he added a Latin school and a school for girls Arrangements were made to care for orphans, and poor scholars received their meals free of charge A corps of able teachers gathered around him, new buildings were erected, a bookseller's shop and other forms of business were undertaken to help to defray expenses Francke's theological enemies sought to injure his thriving educational institute, but in 1713 the King of Prussia, Frederick William I, visited it and promised Francke his support From that time the institute grew unchecked, until at Francke's death the Pedagogium, or school for the children of the wealthy, had 40 students, the Latin school 400, the common schools 1725 One hundred and seventy-five teachers were employed, all of whom were students at the University of Halle. They received their board, and afterward their lodging, for their services A seminary for teachers was established as early as 1707, which aimed to train young men in the methods of teaching Thus the institute became the foremost training school of the time for teachers The extraordinary success of Francke's Institute led to the establishment of similar institutions in other German cities, and the influence of Francke and his disciples materially affected the character of the Prussian system of public education, which was established by Frederick William I and remains unchanged in its essential features at the present day

Francke published a number of pamphlets on religious and pedagogical subjects, but these are of minor importance as compared with his institutional work Consult Kramer, *Franckes padogogische Schriften* (Langensalza, 1885), id, *August Hermann Francke, ein Lebensbild* (Halle, 1880–82), Stein, "August Hermann Francke," in *Deutschen Geschichts- und Lebensbildern* (ib, 1894), Fries, *Die Frankeschen Stiftungen in ihrem zweiten Jahrhundert* (ib, 1898)

FRANCKE, Kuno (1855–) A German-American scholar and author, born at Kiel He was educated at the University of Munich and was appointed professor of German literature and subsequently professor of the history of German culture at Harvard University, Cambridge, Mass He also became curator of the Germanic Museum of Harvard University His publications include *Zur Geschichte der Schulpoesie des zwolften Jahrhunderts* (1878), *De Hymno in Cererem Homerico* (1880), *Libelli de Lite Imperatorum et Pontificum* (1892), *Social Forces in German Literature* (1896), *Glimpses of Modern German Culture* (1898), a *History of German Literature* (8th ed., 1907), a *Handbook of the Germanic Museum* (1908), *Die Kulturwerte der deutschen Literatur im Mittelalter* (1910)

FRANCKEN, frank'en A family of painters of Antwerp, 11 in number, living in the sixteenth and seventeenth centuries A similarity of Christian names leads to much confusion in classifying their works When Frans the first found a competitor in Frans the second, he took the name of "the elder," the second being "the younger" But when the third Frans became a rival of the second, the latter took the name of "the elder," and Frans the third became "the younger" The eldest of the Franckens, Nicholaes of Herenthals, died in 1596. None of his work is known —Hieronymus (1540–1610), his eldest son and pupil, studied under Franz Floris and was occupied chiefly in Paris, and in decorating the Palace of Fontainebleau He was court painter to Henry III, of whom he painted a portrait, which, like most of his works, has been lost Among his surviving pictures is "The Beheading of John the Baptist," in Dresden He painted in the hard, gaudy style of Floris —The second son of Nicholaes was Frans Francken "the first" (1542–1616) He studied under Floris and was dean of the Guild of St Luke in 1588–89 He painted many portraits, including that of William of Orange, and religious subjects, the most important of which was the altarpiece "Christ among the Doctors" (Antwerp Cathedral) He is also represented in the museums of Antwerp, Dresden, Vienna, and in the Louvre —Ambrosius (1544–1618), third son of Nicholaes, and also a pupil of Floris, left more works than both his brothers Most of them are religious subjects to be found at Antwerp, in the church of St. Jaques and the museum Among the best of them are the "Miracle of the Loaves and Fishes" and the "Martyrdom of St Crispin," in the Antwerp Museum He was also employed at Fontainebleau in 1570 His productions are in the style of the Floris school, and exaggerated in all respects, but he possesses greater invention than the rest Frans "the first" trained his three sons to the profession—The third of these sons was Frans Francken (1581–1642) "the second," who also signed himself "the younger" until his son Frans grew up, when he signed himself "the elder" He studied in Italy and painted in the manner of the Floris school, but was later influenced by Rubens Among his chief paintings are the "Works of Mercy" in the Antwerp Gallery, "Solon and Crœsus," in the Brussels Gallery, "Christ Washing the Apostles' Feet," in the Berlin Museum, and the "Abdication of Charles V," in the Amsterdam Museum, formerly attributed to Hieronymus He was the most important member of the family, and nearly all European galleries possess his pictures —Frans Francken "the third" (1607–67) imitated Rubens in his religious subjects, of which there are good examples in Antwerp and Augsburg, and painted the figures in pictures of other masters, in particular of Peter Neefs the younger, as may be seen at Dresden and The Hague.

FRANCKENSTEIN, frank'en-stīn, Georg Arbogast, Baron (1825–90) A German legislator He was born at Wurzburg and was educated at Munich An Ultramontane member of the Bavarian Diet, he opposed the participation of Bavaria in the Franco-German War and voted against the entrance of the kingdom into the German Empire In the Reichstag he led the Centrist party He drafted the "Franckenstein Clause," later incorporated as paragraph 7 of the tariff laws (July 9, 1879). He was First Vice President of the Reichstag from 1879 to 1887 Consult Fah's sketch (Freiburg, 1891)

FRANCO-GERMAN WAR OF 1870-71 The immediate cause of this struggle was France's jealousy of the growing importance of Prussia, which power Bismarck was determined to place at the head of a united Germany, and the desire of Napoleon III to strengthen his tottering throne by a successful war against the hereditary foe of the French nation The actual occasion for the outbreak of hostilities was fur-

nished by complications growing out of the political situation in Spain On June 25, 1870, Isabella II of Spain, who had been deposed in 1868, formally abdicated the throne On July 5 the foreign governments were notified of her abdication, and on the same day the fact was made public that Prince Leopold of Hohenzollern had consented to become a candidate for the vacant throne of Spain This consent was said to have the approval of the King of Prussia The news caused intense excitement in Paris, and the Foreign Minister, the Duc de Gramont, caused representations to be made to the Prussian government of the displeasure with which the French government regarded the candidacy of Prince Leopold On July 12 the announcement of the withdrawal of Prince Leopold's candidature was made On the following day the French Ambassador, Benedetti (q v), unceremoniously addressing William I at Ems, insisted that the King should make a declaration to the effect that no Hohenzollern prince would ever be permitted to accept the Spanish crown The King declined to listen to this demand and broke off the interview He sent Bismarck a copy of the French demand, with authority to make use of it This Bismarck did, giving to the press such parts of the communication as would tend to arouse the German people It does not appear that in so doing he misrepresented the attitude of France Taking notice of this publication as if it had been official, the French government, deeming itself called upon to take immediate steps for the defense of the national honor, formally declared war against Prussia, July 19, 1870

While the popular enthusiasm in the two countries in favor of war was about equal, there proved to be a vast difference as to the state of the military preparations The French government supposed that from 450,000 to 500,000 men were available for instant mobilization, but the army was ill organized, imperfectly equipped, and not properly provided with depots. But 250,000 men were ready for the first movements in August, 1870, and there was no reliable reserve The French force was in one body, practically, known as the Army of the Rhine Against this the North German Confederation was able to put into the field an army of about 450,000 men with a reserve of nearly 400,000 The French hoped that the South German states, out of jealousy of Prussia, would refuse to join her, but these joined forces at once with their countrymen, put their troops under Prussian command, and thus added to the overwhelming weight that was thrown upon France The action of Prussia was promptness itself King William arrived in Berlin July 15, meeting Bismarck, Moltke, and Roon, and orders for mobilization were at once given Three armies were formed The first, under General von Steinmetz, was placed near Trèves, forming the right wing, the second, under Prince Frederick Charles, was sent to Rhenish Palatinate, the third, under the Crown Prince of Prussia, took its position on the frontier of Baden. The French forces were scattered over a line of about 100 miles in length The First Corps, under Marshal MacMahon, was placed near Strassburg, the Fifth Corps, under Failly, along the frontier of the Palatinate, the Third Corps, under Marshal Bazaine, near Metz; the Second Corps, under Frossard, not far from the Prussian frontier, near Saint-Avold; the Fourth Corps, under Ladmirault, near Thionville, the reserve forces, under Bourbaki and Marshal Canrobert, were partly at Nancy and partly at the camp of Châlons, the Seventh Corps, under Gen Félix Douay, held the fortress of Belfort These were the positions of the two contending armies towards the end of July, 1870 On the 23d of that month Napoleon appointed the Empress Regent of France, and on the 28th left Paris with the Prince Imperial to take command of the army at Metz The King of Prussia left Berlin to take his place in the field July 31, accompanied by General von Moltke, as chief of staff, and Count Bismarck, and on August 2 established his headquarters at Mainz On the same day a portion of Frossard's corps made an attack on the Prussian position at Saarbruck in the presence of the Emperor and his son After protracted firing the Germans retreated, and the French occupied Saarbruck The results of this engagement were unimportant

The first serious conflict of the war took place, August 4, at Weissenburg, where the German advance guard was attacked by the French under Gen Abel Douay, it ended, after a battle of five hours, in the French troops retiring in great disorder, with heavy loss General Douay was killed The Germans had now 520,000 men and 1170 guns ready for fighting orders, while the entire force of the French (with reserves) amounted to only 350,000 men On August 6, at Worth, the Crown Prince attacked MacMahon, who had been strengthened by divisions of the corps of Failly and Canrobert The French suffered a terrible defeat and lost 8000 in dead and wounded and 6000 prisoners The German loss was over 10,000 officers and men On the same day a bloody battle was fought at Spichern, near Saarbruck, also known as the battle of Forbach, between General Steinmetz and General Frossard. The Germans stormed the heights of Spichern, and the French force was thrown back in disorder on Forbach and Metz The Germans lost 4648 men in killed and wounded, while the French loss amounted to about 2000 men killed and 2000 prisoners Thus both wings of the French army were completely defeated, the original position could no longer be held, and all the French corps gathered into two large masses to retreat along the line of the Moselle Two separate armies were now formed—the one known as the Army of Metz, commanded by Marshal Bazaine, and the other commanded by Marshal MacMahon By August 14 the first German army had advanced to the immediate neighborhood of Metz and by a successful attack upon the French Third Corps under Bazaine baffled the first attempt of that commander to retreat to the line of the Marne This developed into the sanguinary battle of Colombey-Nouilly, or of Courcelles The Prussians lost nearly 5000 men in killed and wounded, the French loss was about 3500 The battle prevented the junction of Bazaine's army with that of MacMahon at Châlons In the battle of Mars-la-Tour, or Vionville, fought on August 16, the army of Bazaine was repulsed by Prince Frederick Charles, and driven back on Gravelotte with immense loss to both sides—about 16,000. On the 18th occurred the great battle of Gravelotte (q.v), in which 200,000 Germans fought against 130,000 Frenchmen Bazaine's army, occupying a very strong position to the west of Metz, was, after nine hours' fighting, completely defeated, cut off from its com-

munication with Paris, and driven back towards Metz The losses were very heavy The French lost about 600 officers and 13,000 men, the Germans, about 900 officers and 20,000 men

Bazaine was now shut up in the fortifications of Metz, which was invested by Prince Frederick Charles A fourth army was organized and placed under command of the Crown Prince of Saxony, to move rapidly upon Paris MacMahon, marching to the relief of Metz, was cut off by the third and fourth German armies, which were converging on Paris, and on the 1st of September was fought the battle of Sedan, the Waterloo of the Second Empire The forces of MacMahon were caught in an unfavorable position, where they could be attacked from all sides, and were driven upon the fortress of Sedan, where, surrounded and defeated, the entire army surrendered (September 2), with the Emperor, who was carried prisoner to Wilhelmshohe By this capitulation 83,000 men, including 40 generals, 230 officers of the staff, and 2595 officers, became prisoners of war, in addition to 21,000 men who had been made prisoners during the battle Meanwhile, on August 31, Bazaine made a sortie from Metz, attempting, during that day and the following, to break through towards the north, but was driven back into the fortress

When the news of the capitulation of Sedan and of the capture of Napoleon reached Paris, it caused an upheaval On September 4 the Third Republic was proclaimed, and a Government of National Defense was formed, of which the chief members were Jules Favre, Crémieux, Ferry, Jules Simon, and Gambetta General Trochu, the military Governor of Paris, was its head. Gradually the Germans closed in on Paris, no serious resistance in the field being attempted. By September 19 the capital was regularly invested The investing force was far inferior to that of the besieged in numbers, but the French forces in Paris were largely a half-trained provisional levy, brimming with disaffection and the spirit of revolution, which afterward broke out in the Commune Strassburg surrendered on September 28 A few days later Gambetta escaped from Paris in a balloon and issued a proclamation from Tours calling for a levy en masse On October 11 General Von der Tann, after defeating a French force, entered Orléans On October 27 Bazaine surrendered at Metz with his army of about 175,000 men to Prince Frederick Charles A gleam of hope was infused into the French by a momentary victory of Gen Aurelle de Palladines, commander of the Army of the Loire, who on November 9 beat back Von der Tann at Coulmiers, near Orléans, the French reentering Orléans on the following day. On November 28, however, Aurelle de Palladines was repulsed at Beaune-la-Rolande, and was again defeated before Orleans on December 2–4 Nor were the other armies put into the field by the appeals of Gambetta more successful in coming to the relief of Paris, where General Ducrot made a desperate attempt to break through the German lines at Brie and Champigny, November 30–December 3 The army of General Chanzy engaged that of the Grand Duke of Mecklenburg on the Loire, December 7–10, but was forced to retreat from this scene of operations, and on Jan 10–12, 1871, he was completely overthrown by Prince Frederick Charles at Le Mans. In the north, where the Germans had reached and entered Rouen as early as December 6, the army of General Faidherbe suffered a defeat at Pont Noyelles, December 23, and another at Bapaume, January 3, and on January 19 it was overwhelmed by General Von Goeben at Saint-Quentin In the east General Bourbaki made a diversion at the close of December which was at first successful, but he was repulsed by General Von Werder before Belfort on January 15–17 On December 27 the Germans opened a bombardment on Mont Avelon, one of the forts of Paris, and two days later they obtained possession of the fort After an unsuccessful sortie from Mont Valerien, led by General Trochu, January 19, Paris, which had reached the point of starvation, capitulated Jan 28, 1871, a partial armistice having been arranged between Bismarck and Jules Favre. Four days later the remains of Bourbaki's army retired into Switzerland In the meanwhile, during the progress of the siege of Paris, the work of consolidating Germany into an empire had been consummated by the proclamation at Versailles, on January 18, of William I as German Emperor The armistice gave France an opportunity to form a responsible government that could conduct peace negotiations On February 8 elections were held for a National Assembly, which met at Bordeaux, February 12, and which, on February 17, elected Thiers Chief of the Executive On February 16 the capitulation of Belfort closed the military operations The Germans occupied all the forts around Paris France was helpless, with nearly all her trained soldiers disarmed or prisoners of war, while French territory was occupied by a German army of more than half a million men. The new government of France now undertook the task of securing peace

The indefatigable labors of Thiers resulted, on February 26, in the arrangement of preliminary terms of peace with Germany, which were formally accepted by the National Assembly, March 1, by a vote of 546 to 107 The terms of this treaty were as follows (1) the cession by France of the German-speaking part of Lorraine, including Metz and Thionville, and of Alsace, excepting Belfort, (2) France to pay five milliards of francs as war indemnity—one milliard in 1871, and the balance in installments extending over three years, (3) the evacuation of French territory to begin upon the ratification of the treaty, Paris and some western departments to be evacuated at that time, the troops in other departments to be withdrawn gradually as the indemnity was paid, (4) the German troops to be maintained at the cost of France, and not to levy upon the departments occupied by them, (5) inhabitants of the annexed territories to be allowed to choose between the two nationalities; (6) prisoners of war to be immediately set at liberty, (7) negotiations for a definitive treaty of peace to be opened at Brussels after the ratification of this treaty; (8) the administration of the departments occupied by the German troops to be intrusted to French officials under the control of the chiefs of the German corps of occupation The definitive treaty of peace was signed at Frankfort, May 10, 1871. The two great results of the war were the establishment of the Third Republic in France and the consolidation of Germany into an empire

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(London, 1893) An official history is *Der deutsch-franzosische Krieg, 1870–71*, by the German General Staff (Berlin, 1874–81), trans into English (London, 1874–84) Chuquet, *La guerre de 1870–71* (Paris, 1895), is called by Seignobos the "handiest and most reliable history of the whole war" The diplomatic history of the war is treated in Valfrey, *Histoire du traité de Francfort* (Paris, 1874–75), and Sohel, *Histoire diplomatique de la guerre franco-allemande* (ib, 1875) Washburne, *Recollections of a Minister to France* (New York, 1887), are valuable memoirs by the American Minister, who filled a difficult post with tact and discretion See articles on the various battles mentioned in this text and consult also French Official History, *La guerre de 1870–1871* (Paris, 1902), L Blumenthal, *Journals for 1866, 1870, and 1871* (New York, 1902), E B Washburn, *America's Aid to Germany in 1870–1871* (St Louis, 1905), G Lehmann, *Die Mobilmachung von 1870–1871* (Berlin, 1905), P Lehautcourt (General Palat), *Histoire de la guerre de 1870–1871* (Paris, 1901–07), G von Bismarck, *Kriegs-Erlebnisse, 1866 und 1870* (Dessau, 1907), L. van Neck, *1870–1871 illustré, Campagne franco-allemande spécialement au point de vue de la Belgique* (Bruxelles, 1907), B E Palat, *La stratégie de Moltke en 1870* (Paris, 1908), F B. Maurice, *The Franco-German War*, "Cambridge Modern History" (London, 1909), O E Ollivier, *Philosophie d'une guerre* (Paris, 1910), H K B von Moltke, *Extracts from Moltke's Correspondence Pertaining to the War 1870–1871* (Army Service School Press, Fort Leavenworth, 1911)

FRANÇOIS, fran'swa', JEAN CHARLES (1717–69). A French engraver, born at Nancy He was the inventor of engraving in imitation of crayons, which obtained for him the position of engraver to the King His most important plates are a series of portraits for Saverin's *Histoire des philosophes modernes* (1761–69), "The Virgin," after Vien, "Erasmus," after Holbein, "Thomas Hobbes," after Pierre, and "The Dancer," after Boucher. From a technical point of view his work is of mediocre quality.

FRANÇOIS, KURT VON (1852–). A German cartographer and explorer of Africa He was born at Luxemburg and served in the German army during the War of 1870–71, in which his father, General François, met his death at the battle of Spichern He was a member of Wissmann's African expedition in 1883 and in 1885 accompanied him and the Baptist missionary Grenfell on the expedition in which two tributaries of the Congo were explored In 1887 he penetrated from the coast at Togo northwestward to about the twelfth parallel, north latitude, and in 1889 he was appointed commander of the military contingent in German Southwest Africa As acting Imperial Commissioner, to which position he was appointed in 1891, he explored as far as Lake Ngami His vigorous warfare (1893–94) against the native chieftain, Henrik Witboi, an inveterate enemy of German domination, resulted in the total rout of the Hottentots Because of disagreements among his officers and the impossibility of a complete subjugation of the enemy, he resigned his commission in 1895 In 1901 he settled in German Southwest Africa He made valuable maps of southwest Africa, the Okavango region, etc, and wrote· *Im Innern Afrikas. Die Erforschung des Kassai*, in collaboration with Wissmann (2d ed, 1891), *Die Erforschung des Tschuapa und Lulongo* (1888), *Deutsch-Suduestafrika Geschichte der Kolonisation bis zum Ausbruch des Krieges mit Witboi* (1899), *Krieg in Suduestafrika* (1900), *Staat oder Gesellschaft in unseren Kolonien?* (1901), *Kolonisation-system in unseren Kolonien* (1909)

FRANÇOIS, LUISE VON (1817–93) A popular German novelist She was born at Herzberg, Province of Saxony, and after the death of her father lived for several years at Weissenfels, Minden, and Halberstadt, but chiefly with her uncle, General Karl von François, at Potsdam Among her novels may be mentioned *Die letzte Reichenburgerin* (7th ed, 1900), *Frau Erdmuthens Zwillingssohne* (2d ed, 1891), *Stufenjahre eines Glucklichen* (2d ed, 1878), *Der Katzenjunker* (1879) She wrote also several short stories and a play Consult Ebner-Eschenbach in *Velhagen und Klasings Monatshefte* (Leipzig, 1894)

FRANÇOIS DE NEUFCHÂTEAU, de nē'-sha'tō', NICOLAS LOUIS FRANÇOIS, COUNT (1750–1828) A French statesman and poet He was born in Lorraine and was educated at the Jesuit college of Neufchâteau, and this institution gave him its name after the publication in 1765 of a volume of poetry which was highly praised Encouraged by Voltaire, he obtained the chair of rhetoric at Toul in 1770 In 1783–88 he was *procureur général* in Santo Domingo He was deputy to the National Assembly and to the Legislative Assembly, of which he became secretary and finally President In 1793 he was imprisoned for the publication of a comedy, *Paméla, ou la vertu recompensée* In 1797 he became Minister of the Interior under the Directory, and in that post did much for inland navigation and for industrial exhibitions In 1804–06 he was President of the Senate After the Restoration he retired from politics His works include *Fables et contes en vers* (1814), *Les trois nuits d'un goutteux* (1819), and many miscellaneous articles (notably on agriculture) and translations Consult the biographical sketch by Lamoureux (Paris, 1843) and Simian, *François de Neufchâteau et les expositions* (ib, 1889)

FRAN'COLIN (Fr, Sp *francolin*, Portug *francolim*, probably dim of Portug *frango, frangão*, chicken) A bird of the genus *Francolinus*, or related genera, of the family Phasianidæ, closely allied to partridges They are natives of Asia and Africa One species only (*Francolinus francolinus*) was formerly found in the most southern parts of Europe, but is now extinct there, though still common in various parts of Asia and in Cyprus About 45 of the 50 species of francolin known are found in Africa, and all are objects of sport and good for food

FRANCO'NIA (ML, from OHG *Franchun*, Franks) The name of a mediæval duchy in Germany, embracing the country on both sides of the Main, from the Rhine to the mountains of Bohemia It also included some territory on the west bank of the Rhine, around Mainz, Speyer, and Worms The region was conquered by Clovis and later was dependent upon Austrasia (q v) After the Treaty of Verdun (843) it was part of the German kingdom In 911 Conrad of Franconia was raised to the royal

throne, and a century later the choice of the German princes again fell upon the Franconian house, which, by its direct and collateral branches, gave kings and emperors to Germany from 1024, when Conrad II, the Salic, began his reign, till 1125, when Henry V died, and again from 1138, when Conrad III ascended the throne, till 1254, when Conrad IV, the last Hohenstaufen Emperor, died Franconia was divided into Franconia Occidentalis and Franconia Orientalis (West and East Franconia) The former, in 1155, passed to Conrad, son of Frederick Barbarossa (q v), who was given the title of Count Palatine of the Rhine During its connection with the crown, Franconia increased in extent and importance, while its great spiritual principalities of Mainz, Speyer, Worms, Bamberg, and Wurzburg acquired both wealth and political influence After 1155 the name Franconia was usually given only to the eastern portions of the ancient duchy In 1512 Maximilian I established the circle of Franconia, without, however, including in it the Palatinate. With the dissolution of the Holy Roman Empire in 1806, the name of Franconia disappeared from among the political divisions of Germany, but since 1837 it has been revived in the Kingdom of Bavaria (q v), where those portions of the ancient Franconian region which had been known as the circles of the Upper Main, Rezat, and Lower Main are now designated Upper, Middle, and Lower Franconia

Upper Franconia includes the northeast portion of Bavaria It is watered by the Main, Saale, and other streams Its surface rises in the Fichtelgebirge to a height of 3500 feet Farther west are the mountains of the Franconian Forest, which are considerably lower The valleys produce good crops and fruit, and the district is rich in minerals Pop, 1900, 607,903, 1910, 661,126 The capital is Bayreuth

Middle Franconia, which borders on Wurttemberg, is intersected by branches of the Franconian Jura, but has few rivers of importance besides the Regnitz and Altmuhl, which are connected by the great Ludwigskanal It produces good wine, but is principally celebrated for its hop gardens Pop, 1905, 868,072; 1910, 929,985 The capital is Anspach Nuremberg is the principal town.

Lower Franconia, which occupies the northwest part of Bavaria, is the richest and best cultivated of the Franconian districts, and is celebrated for the excellence of its wines The district is noted for its mineral springs at Kissingen, Bruckenau, and Wipfeld Pop, 1900, 650,758, 1910, 709,832 The capital is Wurzburg Consult Stein, *Geschichte Frankens* (2 vols, Schweinfurt, 1883–86)

FRANCONIA MOUNTAINS. See WHITE MOUNTAINS

FRANCS-TIREURS, frăn'tē-rēr' (Fr, free-shooters) The name given to bands of French soldiers that sprang into existence during the Franco-German War of 1870–71 They had their origin in the military societies formed in northeastern France as early as 1867. They did not form a part of the regular army until November, 1870, and at first their military organization was very imperfect They waged irregular warfare by attacking small detachments of the enemy and baggage trains as well as single travelers At first they were not recognized by the Germans as having any military standing at all, and when seized were shot or hanged, but after a time, when they received a better organization, and cooperated with the regular French army, such recognition was accorded them They carried on an irregular warfare long after the main French armies had been wiped out Their most celebrated feat was the blowing up of the Moselle Railway Bridge at Fontenoy, Jan 22, 1871 Consult *Les Chasseurs des Vosges* by Lieutenant Colonel Saint-Etienne (Toul, 1906) See GUERRILLAS

FRANCUCCI, fran-kōō'chē, INNOCENZO. See IMOLA, INNOCENZA DA

FRANEKER, fran'e-kēr A town of the Netherlands, in the Province of Friesland, situated on the canal between Harlingen and Leeuwarden (Map Netherlands, D 1) It was formerly the seat of a university founded in 1585 by the Frisian states and abolished by Napoleon in 1811 The church of St Martin dates from the fifteenth century, a town hall (restored) was built in 1591, and there is also a curious astronomical model, showing the motions of the planets, built in 1774–81 by a citizen Other institutions are an athenæum and an observatory The town manufactures bricks and oil, builds ships, and carries on trade in grain and flax. Pop, 1901, 7187, 1911, 7642

FRANGIPANI, fran'je-pa'nē (named after the Marquis Frangipani, major general under Louis XIV) A scent or perfume, either derived from or manufactured in imitation of a flower produced by a West Indian tree of the genus *Plumiera,* called the red jasmine

FRANGIPANI. An illustrious and powerful Roman house, which began with Leo Frangipani in 1014 and attained the summit of its power in the eleventh and twelfth centuries The residences and strongholds of the Frangipani were near the Arch of Titus and the Coliseum. The rivalry of the Frangipani with the house of the Pierleoni not only occasioned repeated civil wars in the state, but likewise troubles in the church In the early part of the twelfth century the two families controlled the college of cardinals The Frangipani were usually partisans of the Emperor, the Pierleoni usually opponents After the death of Frederick II, however, the family interest was enlisted in the papal cause Giovanni Frangipani captured Conradin of Hohenstaufen and delivered him, in 1268, to Charles of Anjou The origin of the name Frangipani is attributed to the family's benevolent distribution of bread in time of famine Consult Gregorovius, *Rome in the Middle Ages,* vols iv–v (London, 1896–97)

FRANGIPANI was also the name of a noble family of Croatia, whose members distinguished themselves in the wars against the Turks The most celebrated of the line were John Frangipani, who about 1390 was made Ban of Croatia, Slavonia, and Dalmatia, and Christopher Frangipani, who fought at Mohács (1526). Francis Christopher Frangipani about 1670 entered into a conspiracy against the Emperor Leopold I, having for its ultimate object the restriction of Germanic influences in Hungary and the reassertion of the Magyar power The conspiracy was discovered and Frangipani was executed in 1671

FRANK, frank, ALBERT BERNHARD (1839–1900). A German botanist, born in Dresden and educated at Leipzig From 1881 until his death he was professor of plant physiology at the Agricultural College at Berlin His works consist chiefly of valuable textbooks and include:

Die Krankheiten der Pflanzen (1880), *Lehrbuch der Pflanzenphysiologie mit besonderer Berücksichtigung der Kulturpflanzen* (1890), *Pflanzenbuch für niedere und mittlere Landwirtschaftsschulen* (1894), *Kampfbuch gegen die Schädlinge unserer Feldfrüchte* (1897), with Kruger, *Schildlausbuch* (1900)

FRANK, FRANZ HERMANN REINHOLD VON (1827–94) A German Lutheran theologian, born at Altenburg and educated at Leipzig He was professor of theology at Erlangen from 1857 until his death, was cofounder of the *Neue Kirchliche Zeitschrift*, and wrote a large number of works, most of which have been several times republished These include *System der christlichen Gewissheit* (2d ed, 1885–86, Eng trans by Evans, 1886), his most characteristic work, *System der christlichen Wahrheit* (2d ed, 1885–86), *System der christlichen Sittlichkeit* (1884–87), *Zur Theologie A Ritschl's* (3d ed, 1891), *Geschichte und Kritik der neuern Theologie* (1894, 3d ed, 1898) Consult Seeberg's memoir (Leipzig, 1894) and Weber, *Franks Gotteslehre* (ib, 1901)

FRANK, GUSTAV WILHELM (1832–1904) A German Protestant theologian, born in Schleiz He was educated at Jena and held a professorship at that university from 1864 to 1867, when he was appointed professor of dogmatics and ethics at the University of Vienna He retired in 1902 He edited Apelt's *Religionsphilosophie* (1860) and wrote *Geschichte der protestantischen Theologie* (1862–75), *Die evangelisch-theologische Fakultät in Wien von ihrer Gründung bis zur Gegenwart* (1871), and *Das Toleranzpatent des Kaisers Joseph II* (1882).

FRANK, JACOB (1726–91) A pseudo-Messiah of the Jews and founder of a sect called Frankists after himself, or Zoharites after their sacred book His real name was Jakob Lebowicz, and he was the son of a rabbi of southern Galicia When a young man, traveling in the East, the Turks called Jakob a Frank, their common appellation for a European, and this surname he always retained He and his father were members of a semi-Mohammedan sect, the shabbathians. He returned to Poland in 1755 and became the centre of a secret society, against which charges of immorality were made before the rabbis. Later he claimed to have direct revelations from heaven, calling for the conversion of his followers to Christianity, as a transition stage to a future Messianic religion In 1859 the Frankists were baptized in Lemberg, many of the Polish nobility acting as sponsors Almost immediately Frank's sincerity was doubted, and in 1760 he was imprisoned; but this only made his followers more faithful. After his release he spent the rest of his life in Offenbach, a small German town, supported in luxury by the gifts of his followers The Frankists were gradually absorbed in the Christian community Consult Graetz, *Frank und die Frankisten* (Breslau, 1868)

FRANK, JOHANN PETER (1745–1821). A German physician He was born at Rothalben, Bavaria, and studied medicine at Heidelberg and Strassburg. In 1785 he accepted a call to Pavia, where he remained until his appointment to the directorship of the General Hospital at Vienna (1795) With this institution he was associated until 1804, during which time he also delivered lectures at the university After a short term as professor of medicine at Vilna, Russia, he was appointed physician in ordinary to Czar Alexander I, returning to Vienna in 1808 His influence upon the development of medical practice in Lombardy, Austria, and Russia was extraordinary He devoted himself chiefly to the improvement of public sanitation, of which he has been called the founder, and several of the works written by him on this subject have served as a basis for the further development of sanitary legislation His principal works include *System einer vollständigen medizinischen Polizei* (6 vols, 1779–1819, supplement, 3 vols, 1812–27, trans into Italian, 1808–30), *De Curandis Hominum Morbis Epitome* (6 vols, 1792–1821, German trans, 3d ed, 1840–41), *System der landwirtschaftlichen Polizei* (1789–91) *Selbstbiographie* (1802) Consult Seiler's *Peter Frank* (Dresden, 1895)

FRANKALMOIGNE, frăṅk'ăl-moin' (Lat *libera eleemosyna*, free alms) A form of feudal tenure, whereby lands were held by religious houses or persons for charitable purposes By the ancient common law of England, a man could not alien lands which came to him by descent without consent of his heir, but he might give a part to God in free alms It was an old Saxon tenure and continued under the Norman revolution, through the great respect that was shown to religion and religious men This is the tenure by which almost all the ancient monasteries and religious houses held their lands, and by which the parochial clergy and very many ecclesiastical foundations hold them at this day The Statute of 12 Car II, c 24, which abolished the old tenures, specially reserved tenure in frankalmoigne A tenant in frankalmoigne did no fealty to his overlord, and in the event of failure to perform the service the latter was not entitled to distrain, but might complain to the ordinary or visitor In this respect this tenure differed from tenure by divine service, i e, where lands were given on condition of performing a specified service, as saying a mass on a particular day, or distributing certain alms In this case the tenant was bound to render fealty and the lord was entitled to distrain on failure to perform the service By the Anglo-Saxon law, lands held in frankalmoigne were subject to the *trinoda necessitas* of repairing highways, building bridges, and repelling invasions In Scotland lands conveyed to the Church *in puram eleemosynam* were said to be mortified See FEE, FEUDALISM, TENURE Cf MORTMAIN

FRANKAU, MRS JULIA See DANBY, FRANK

FRANKEL, frĕṅk'el, BERNHARD (1836–1911) A German physician He was born at Elberfeld and was educated at Wurzburg and Berlin, where in 1884 he was appointed professor In recognition of his valuable investigations on diseases of the throat and nose, he was, in 1887, made director of the clinical institute of the university especially devoted to the treatment of those diseases He wrote on diseases of the nose for Ziemssen's *Handbuch der speziellen Pathologie und Therapie* (1879), "Skrofulose und Tuberkulose," in Gerhardt's *Handbuch der Kinderkrankheiten* (1878), and *Der Kehlkopfkrebs* (1889) After 1900 he edited the *Zeitschrift fur Tuberkulose und Heilstattenwesen*

FRANKEL, WILHELM (1841–95) A German engineer. He was born at Odessa, Russia, and was educated at the Polytechnic Institute at Dresden, where he was appointed professor in 1869. His articles on bridge and railroad con-

struction include "Bewegliche Brucken," in the *Handbuch der Ingenieur-Wissenschaften* (2d ed, 1888)

FRANKEL, frank'el, ZECHARIAS (1801–75) A German Jewish theologian, born in Prague He graduated from the University of Budapest in 1831, was rabbi at Leitmeritz, Bohemia (1832–36), and at Dresden (1836–54), and afterward, as president of Breslau Seminary, he introduced modern scientific and critical studies as a part of the rabbinical education Though approving religious research, he remained an orthodox Hebrew He edited the *Zeitschrift fur die religiosen Interessen des Judentums* in 1844–46, and the *Monatsschrift* in 1851–68 His works include *Die Eidesleistung bei den Juden in theologischer und historischer Beziehung* (1840, 2d ed, 1847), *Historisch-kritische Studien zu der Septuaginta nebst Beitragen zu der Targumim Vorstudien zu der Septuaginta* (1841), *Der gerichtliche Beweis nach mosaisch-talmudischem Recht* (1846), *Darke ha-Mishnah* (1859)

FRANKENBERG, frank'en-bĕrk. A flourishing manufacturing and trading town of Saxony, Germany, 32 miles southwest of Dresden (Map Germany, E 3). Its institutions include a gymnasium, a trade school, a teachers' seminary, and a textile school It has manufactures of cottons, woolens, silk stuffs, carpets, draperies, dyes, furniture, castings, machinery, cigars and the largest calico-printing works in Saxony. Near by are many ruined churches and castles, at one of which is an iron cross, dedicated to the poet Korner Pop, 1900, 12,726, 1910, 13,576

FRANKENHAUSEN, frâṅk'en-hou'zen A town of the Principality of Schwarzburg-Rudolstadt, Germany, on the Wipper, 27 miles north-northwest of Weimar (Map Germany, D 3) It has a teachers' seminary, a gymnasium and a technical institute There are productive salt springs here, and the manufacture of cigars, sugar, and articles in mother-of-pearl is carried on Its baths are much frequented for curing scrofula In the neighborhood are mines of lignite, sandstone quarries, and the Barbarossa cavern, discovered in 1865 Pop, 1900, 6383; 1910, 6600 Frankenhausen was the scene of a battle between the rebellious peasants under Thomas Munzer, May 15, 1525, and the Saxon, Brunswick, and Hessian troops, in which the former were defeated

FRANKENSTEIN, frank'en-stīn, OR, THE MODERN PROMETHEUS A novel by Mrs Shelley, begun in 1816, and published anonymously at London in 1818 An American edition appeared at Philadelphia in the same year, and another at Boston in 1869 The title character of the tale is a student who finds the secret of creating life artificially His first creation is a horrible yet pathetic monster, who murders his friend and pursues Frankenstein himself from one land to another, complaining of his loneliness and begging his unfortunate maker to create a mate for him

FRANKENTHAL, frank'en-tal A flourishing industrial town of Germany, situated in the northeastern part of the Bavarian Palatinate, about 10 miles northwest of Mannheim and near the Rhine, with which it is connected by a canal The portal of the abbey church, founded in 1119, is very interesting, also a monument to veterans of the Napoleonic Wars The industrial establishments of Frankenthal include machine shops, iron foundries, and sugar refineries, the manufacture of dynamos, machinery, boilers, school furniture, cooperage, corks, toys, gymnastic apparatus, soap, church bells, and cement goods Frankenthal dates from the eighth century Pop, 1900, 16,849, 1910, 18,779

FRANKFORT, or **FRANKFORT-ON-THE-MAIN** (Ger. *Frankfurt am Main*, *pron* frank'foort am mīn). A city of Prussia, in the Province of Hesse-Nassau, Government District of Wiesbaden, situated on the right bank of the navigable Main, 24 miles above its confluence with the Rhine at Mainz (Map Germany, C 3) It lies in a fertile and picturesque plain surrounded by mountains The city embraces the important suburb of Sachsenhausen on the left bank, with which it is connected by several stone or iron bridges Other towns formerly separate but now incorporated with Frankfort are Bornheim, Bockenheim, Niederrad, Oberrad, and Seckbach Frankfort still has many old and narrow streets with high-gabled projecting houses, but its ancient walls and ramparts have been converted into promenades, and there are now wide handsome streets and broad quays in the modernized sections The gates of the famous Judengasse (Ghetto), which were closed at night to prevent the egress of the Jewish inhabitants, were razed at the time of the French occupation in 1806. Gradually all the interesting old houses in this street, now called Bornestrasse, have been torn down, except the family house of the Rothschilds, one of the attractions for sightseers. In the heart of the ancient town is the Romerberg, or market place, with the Justitia Fountain in its centre It was the scene of popular rejoicings after the election of a king Hebrews were formerly not allowed to enter this square The main artery of the new town is the Zeil, continued by the Kaiserstrasse The most prominent squares are the Rossmarkt with the Gutenberg Monument, the Goetheplatz with Schwanthaler's statue of Goethe, the Schillerplatz with the statue of Schiller, the Kaiserplatz with an attractive fountain, the Borsenplatz, and the Opernplatz Among the spacious streets leading to the outer quarters of the city the Bockenheimer Landstrasse is the most noteworthy

The ancient cathedral of St Bartholomew ranks first among Frankfort's ecclesiastical structures Founded about 870, it was built after Gothic patterns at different periods between 1235 and 1415 The election of the German kings, and from 1558 the coronation of the Roman emperors, took place here The Wahlkapelle (election chapel) dates from 1355 The cathedral was seriously damaged by fire in 1867, and its restoration was completed in 1881 Of the other Roman Catholic churches, there may be mentioned the church of St Leonhard, erected in 1219–1507, and the church of Our Lady (consecrated 1340) The leading Evangelical churches are the Paulskirche, erected in 1787–1833 and memorable as having been the seat of the National Parliament of 1848–49, the Nikolaikirche, a graceful edifice of the thirteenth century; the Katharinenkirche, built in 1678–81, containing fine monuments and paintings, and the new church of St Peter (1892–95), with a tower 250 feet high The most prominent among the ancient secular buildings is the Romer, which is in reality a group of 12 separate mediæval houses, reconstructed and enlarged at various times. Here in the Kaisersaal, or Imperial Hall, the newly elected King held his public banquet. The hall is em-

bellished with good modern portraits of the German kings and Roman emperors, from Charlemagne to Francis II, 52 in all Other interesting old structures are the Leinwandhaus, or Draper's Hall, a fifteenth-century building reconstructed in 1892 as the Municipal Historical Museum, which contains a valuable collection of antiquities and some paintings, and among whose documents the Golden Bull is preserved (see *History*, below), the Gothic Haus Fursteneck, the Steinerne Haus of 1464; the Haus zum grossen Engel of 1562, half Gothic and half Renaissance, the Tuchgaden, where the guild of butchers was wont to celebrate the coronation of the emperors, the Goldene Wage, with an ornate façade, and the Haus zum Rebstock, with its picturesque court More famous is the Goethe house, in which the poet was born in 1749 and lived till 1775 The house is now to be seen as it was in Goethe's youth, the restorations and refurnishings being due to the Deutsche Hochstift The adjoining Goethe Museum contains portraits, autographs, letters, etc, and also the Goethe Library, which contains some 25,000 volumes representative of or dealing with the Goethe period of German literature

Among the modern public buildings are the City Library, having a fine Corinthian portico, the Municipal Record Office, the new Exchange with a handsome hall and rich façade, the beautiful opera house, accommodating 1900 spectators, the law courts and the post office, and the magnificent Central Railway station, opened in 1887 In Sachsenhausen is situated the splendid Stadel Art Institute, in the Italian Renaissance style, with a fine portal and a dome Its notable picture gallery is especially rich in specimens of the Dutch and the early Flemish masters and of the older Dusseldorf school Hals, Brouwer, Teniers the Younger, Van der Weyden, and Van der Velde are well represented, and Van Eyck and Moretto merit particular attention. Among the moderns, Overbeck, Veit, Lessing, Bocklin, and Lenbach are also to be seen to advantage The gallery comprises, in addition, some interesting sculptures, and one of the best collections of engravings in Germany (numbering 60,000 examples), and a school of art for students of painting, sculpture, and architecture The environs and the public grounds which surround Frankfort, on the site of the ancient fortifications, are very attractive The Taunus promenade is especially noteworthy Among the statues and monuments not already mentioned are those of William I, Börne, and Charlemagne (on the picturesque mediæval Old Bridge across the Main), and Schopenhauer, who lived in Frankfort from 1831 to 1860

The important commercial standing of Frankfort is due chiefly to its financial strength, although its industries developed considerably during the last quarter of the nineteenth century The manufactures include chemicals (principally printer's ink), gold and silver wire, machinery, carpets, drugs, tobacco, and electric supplies The city is the seat of many of the most important industrial and mercantile associations of southern Germany, as well as the home of some of the strongest moneyed institutions in the world the banks of Frankfort having been famous since the days of the early Rothschilds Commercially it was well known as early as the sixteenth century, when its semi-annual fairs attracted merchants from every direction With the establishment of the German Customs Union and the development of continental railway systems, its advantages have considerably diminished in importance The supremacy in the book-publishing trade, which Frankfort enjoyed for many generations, was long ago gained by Leipzig The city is one of the most important railway centres of Europe, and its shipping, through the recent canalization of the Main and important improvements of the river harbor, has considerably increased

The government is administered by a chief burgomaster, an assistant burgomaster, 24 magistrates, 3 assessors, and a council of 64 members The municipality operates its own water works and gas plant, but has leased its street railways to a private company The water supply is excellent The superior sanitary conditions have reduced the death rate to a low figure The educational institutions include an Academy of Social and Commercial Sciences, a free Institute of Higher Education (*Hochstift*), three gymnasia, a number of realschulen, an industrial art school, several music schools, a teachers' seminary, and several homes for imbecile and physically deformed children The Museum of Art and Industry has an interesting collection of furniture, china, bronzes, panelings, etc The municipal library contains about 350,000 volumes, a collection of coins, and Marchese's marble statue of Goethe There are also not a few smaller public libraries, reading rooms, learned societies, art leagues, and botanical and zoological gardens The three important theatres receive subsidies from the city The hospitals and other charitable institutions are numerous and creditable examples of their kind

In 1817 Frankfort had 41,458 inhabitants, in 1840, 55,269, in 1871, 59,264 Since 1871 the population has increased enormously, partly because of the annexation of suburban districts In 1880 the population was 136,819, in 1890, 179,985, in 1900, 288,989, in 1905, 344,951, in 1910, 414,576, of whom 250,505 were returned as Evangelical, 129,867 Roman Catholic, and 26,228 Jewish The area of the city at the 1910 census was 135 square kilometers (52 square miles)

History Although Frankfort does not appear in history until 793, it is probable that at a very early period some settlement occupied the present site of the city, which was then the meeting place of a number of Roman military roads running from Mainz east In 794 Charles the Great held a church council at Franconovurd (see FRANKFORT, COUNCIL OF), and mention is made at the same time of a palace there, which Charles's son, Louis the Pious, greatly enlarged in 823 and made his residence After the partition of Charles's empire, Frankfort became the capital of the East Frankish Kingdom, and as such it frequently appears in the documents of the time in connection with many important diets and ecclesiastical assemblies Its political importance declined after the extinction of the Carolingian dynasty, but it still remained an important centre of trade After 1152 the kings of the Germans were chosen at Frankfort, and this custom was formally sanctioned by the Golden Bull of 1356, which made it the *Wahlstadt*, or Electoral City of Germany In 1245 Frankfort attained the rank of a free Imperial city, and from that time until about the middle of the fourteenth century it steadily acquired greater powers of self-government, including an

independent mint Frankfort adopted Protestantism about 1530, and in 1536 it joined the Schmalkaldic League (q v), for which it had to pay a fine of 80,000 gulden After the middle of the sixteenth century the German emperors were crowned here The town suffered severely from pestilence during the Thirty Years' War Like many another city of Germany, it was ruled for hundreds of years by a merchant oligarchy, which bitterly resisted all attempts on the part of the guilds to secure a share in the government In 1612 a popular insurrection under the leadership of one Fettmilch broke out against the misgovernment of the patrician families The lower classes improved the opportunity to vent their spite upon the Jews, who from an early period constituted an important element of the population The Jews were forced to flee from the city, and for four years the popular leaders were in power Order, however, was restored in 1616 by the intervention of the Emperor The Jews were restored, and the only result of the insurrection was to strengthen the ruling oligarchy The political power of the trade guilds was completely swept away and passed into the hands of the city rulers In the revolutionary wars Frankfort was occupied by the French in 1792, in 1796, and again in 1806 Each time she had to pay an extremely large tribute In 1806 it ceased to be a free Imperial city and was given by Napoleon to Dalberg, the Primate of the Confederation of the Rhine In 1810 Napoleon created for Dalberg the Grand Duchy of Frankfort, having an area of about 3200 square miles This disappeared with the downfall of Napoleon, and Frankfort regained its rank (along with Hamburg, Bremen, and Lubeck) as a free city at the Congress of Vienna, and in 1816 became the capital of the German Confederation During the revolutionary period of 1848 it was the very centre of German nationality and the battle ground of the opposing tendencies of the time The Vorparlament (q v.) met there on March 31, 1848, and from May 18, 1848, to May 30, 1849, it was the seat of the National Assembly convened to bring about the reconstitution of Germany The period after 1850 was marked by the abandonment of the old oligarchic constitution and the enactment of liberal legislation Freedom of labor was then completely established for the first time, and the Jews were emancipated In the War of 1866 Frankfort embraced the cause of Austria The city was occupied by the Prussians on July 16, and on October 18 it was incorporated with Prussia On May 10, 1871, the definite treaty of peace, making the end of the Franco-German War, was signed at Frankfort Consult Bleicher, *Statistische Beschreibung der Stadt Frankfurt am Main und ihrer Bevolkerung* (2 parts, Frankfort, 1892, 1895), Wolff and Jung, *Die Baudenkmaler in Frankfurt* (ib, 1895), Stricker, *Neuere Geschichte von Frankfurt seit 1806* (ib, 1874–81), Mentzel, *Frankfurt am Main, ein Stadtebild* (ib, 1898), Kanter, *Die Entwicklung des Handels zu Frankfurt a. M.* (Heidelberg, 1902), Horne, *Geschichte von Frankfurt* (4th ed, 1902–03), Whittingham, *A Brief Discourse of the Troubles at Frankfort, 1554–58* (London, 1907); May, *Le traité de Francfort* (Paris, 1909), which contains a good bibliography, *Veroffentlichungen der historischen Kommission der Stadt Frankfurt am Main* (3 vols., Frankfurt, 1909–).

FRANK'FORT A city and the county seat of Clinton Co, Ind, 48 miles northwest of Indianapolis, on the Chicago, Indianapolis, and Louisville, the Lake Erie and Western, the Vandalia, and the Toledo, St Louis, and Western railroads (Map Indiana, D 4) It has a Carnegie library and fine courthouse and high-school buildings The city is in a productive agricultural district, has a kitchen-cabinet plant, and manufactures brick and tile, lumber, butter, flour, brickmaking machinery, agricultural implements, crackers, etc There are also railway repair shops and large wholesale grocery establishments The electric-light plant is owned by the municipality Pop, 1900, 7100, 1910, 8634, 1914 (U S. est), 9286; 1920, 11,585

FRANKFORT. A city, the capital of Kentucky and the county seat of Franklin County, 55 miles by rail east of Louisville, on both sides of the Kentucky River, which is spanned by a suspension bridge 700 feet long, and on the Chesapeake and Ohio, the Louisville and Nashville, and the Frankfort and Cincinnati railroads (Map Kentucky, F 3) The city is situated in the heart of the "Blue Grass" region of the State On one of the hills near by is the Franklin Cemetery, which ranks with the most beautiful in the South, and in which are buried Daniel Boone and other persons prominent in the history of Kentucky There are monuments to the soldiers who died in the wars of 1812 and with Mexico Among the prominent buildings are the State House, the Governor's Mansion, the State Arsenal, the State Penitentiary, the State Home for Feeble-Minded Children, the State Library, and the State Colored Normal School The river is navigable and, by means of a lock and a dam, furnishes abundant water power Frankfort carries on a considerable trade and has extensive manufactures of lumber, whisky, flour, chairs, shoes, twine, carriages, tobacco, hemp, glass, etc The government, under a charter of 1893, is vested in a mayor, elected every four years, and a municipal council, which elects most of the administrative officials not chosen by popular vote Pop, 1900, 9487, 1910, 10,465, 1914 (U S est), 10,882

Frankfort was founded in 1786 by Gen James Wilkinson, who made it the centre of his commercial operations and, for a time, of his Spanish intrigues In 1792 it became the capital of the State, though in 1797 its population was only 441, of whom 112 were slaves In the fall of 1862, during the Civil War, Frankfort was occupied by the Confederate General Braxton Bragg (q v.), and in the presence of the Confederate army and a crowd of citizens, Richard Hawes, the chosen representative of the Confederate faction of the State, was, on October 4, formally inaugurated Governor The approach of General Buell forced Bragg to evacuate on the same day In 1900 William Goebel (q v), Democratic Governor elect, was assassinated here, and Frankfort was the centre of considerable excitement during the prolonged controversy over the governorship

FRANKFORT A village in Herkimer Co., N Y, 10 miles from Utica, on the West Shore Railroad and on the Erie Canal It contains a public library and the old Gates match factory, one of the first in the United States. The chief industries are the manufacture of road machinery and agricultural implements. The water works and electric-light plant are owned by the village. Pop., 1900, 2664, 1910, 3303.

FRANKFORT, COUNCIL OF An assembly convened at Frankfort-on-the-Main by Charles the Great in 794 and attended by all the bishops and many ecclesiastics of the Frankish Kingdom, Italy, Aquitania, and even by some ecclesiastics from England Its principal business related to (1) the doctrine of Adoptianism (see ADOPTIAN CONTROVERSY), as recently revamped by Elipandus and Felix; and (2) the question of image worship Adoptianism was condemned, and also the rendering of Latria (the worship due to God alone) to images, under the mistaken idea that the second Council of Nicæa had sanctioned it The canons of the Council have the customary range and touch upon many matters Consult Mombert, *Charles the Great* (New York, 1888), and Hefele, *Conciliengeschichte* (Freiburg, 1874) The original canons are in Migne, *Patrol Lat*, xcvii See CAROLINE BOOKS

FRANK'FORTER, GEORGE BELL (1860–) An American chemist He was born at Potter, Ohio, graduated in 1886 from the University of Nebraska, where he was instructor in 1885–87 and professor of chemistry in 1893–94, and also studied at the University of Berlin (Ph D, 1893) He taught in the high school of Lincoln, Neb (1887–88), and after 1894 was dean of the School of Chemistry and director of the chemical laboratory of the University of Minnesota He was United States Mint Commissioner in 1900 He served as vice president of the American Association for the Advancement of Science in 1910 His investigations deal with alkaloids, narcotin, narcein, veratrin, isopyrrolin, vegetable oils, pitch, camphor, eugenol, and resins

FRANKFORT-ON-THE-ODER, ō'dēr (Ger *Frankfurt an der Oder, pron* an dēr ō'dēr) A Prussian city, capital of Frankfurt Government District in the Province of Brandenburg, situated on the left bank of the Oder, 50 miles by rail east-southeast of Berlin (Map Germany, F 2). Included within the city limits are several suburbs, the suburb of Damur being on the right of the Oder Damur is connected with the old town by a massive bridge about 850 feet long. On the west of the old town are beautiful promenades laid out on the site of the ancient ramparts Frankfort has a number of fine streets and squares adorned with monuments. Among the older churches are the Evangelical Church of St Mary, a brick building of the thirteenth century, with wood carvings, stained glass, and a candelabrum 13 feet high, and the Reformed Church, built in the transition style at the beginning of the thirteenth century and recently renovated The splendid Rathaus, dating 1607, and the municipal theatre, are among the most noteworthy secular buildings Frankfort has a monument to the poet Ewald von Kleist (q v), and an especially fine monument by Unger to Prince Frederick Charles (died 1885) The university, established in 1506, was transferred in 1811 to Breslau Frankfort has a gymnasium, founded in 1694, a realgymnasium, and a number of other institutions for secondary education The benevolent institutions include one municipal and four private hospitals and two orphan asylums

The manufactures of Frankfort include machinery, boilers, and other iron products, glass articles, pottery, musical instruments, chemicals, chocolate, sugar products, paper, leather, etc There are extensive railway shops. Besides being situated on the navigable Oder, the town is connected by canal with the Elbe and the Vistula An electric street railway accommodates local traffic There are three annual fairs The town has a large garrison Pop, 1890, 55,738, 1900, 61,852, including 4134 Roman Catholics and 747 Jews, 1910, 68,230, the area of Frankfort is 60 square kilometers (23 square miles) The position of Frankfort early gave it great commercial importance in the trade with Poland After receiving municipal rights in 1253 it soon developed into a commercial centre of considerable magnitude The town suffered in the Thirty Years' War and the Seven Years' War as well as during the Napoleonic wars

FRANK'INCENSE (from OF *franc encens* ML *francum incensum*, pure incense, from *francus*, pure, probably connected with OHG *Franko*, Frank, Lat *Franci*, Franks, AS *franka*, Icel *frakki*, spear + *incensum*, incense, from Lat *incendere*, to burn, from *in*, in + *candere*, to burn) A name employed to designate various resinous substances which diffuse a strong fragrance in burning, and which are on that account used in certain religious services There is good reason to believe that the frankincense of the Jews, and also of the ancient Greeks and Romans, was chiefly or entirely the substance now known as olibanum (q v), the product of an Indian tree, *Boswellia serrata* and also *Boswellia carteri* It was formerly supposed to have been obtained from some species of *Juniperus*, which are generally believed not to yield such a product, the prized frankincense of the ancients was brought from the East Several trees, such as certain species of *Protium* and of *Croton*, yield substances used as frankincense in place of olibanum The silver fir in Europe furnishes a resinous product which is the common frankincense of the pharmacopœias American turpentine is also often sold under this name It is used in the composition of stimulating plasters, etc Burgundy pitch is made from it It is a spontaneous exudation from the tree, hardening by exposure to the air, and is generally of a whitish or pinkish color, with a rather agreeable odor and a balsamic taste See BOSWELLIA, FIR

FRANK'ING PRIVILEGE The right of sending mail matter free of charge In England this privilege was secured to members of Parliament at first by warrant of the Postmaster-General and later by statute It was abolished in 1840 In the United States the privilege was accorded by statute to Revolutionary soldiers in actual service, to various executive officers of the government, as well as to Senators and members of Congress It was abolished in 1873, but formally restored a few years later, and at present officers of the United States government may send and receive through the mails all public documents without payment of postage, the name and office of the sender being written thereon This privilege does not extend, however, to those officers who are authorized to make requisitions upon the Postmaster-General for official postage stamps Seeds and agricultural reports may be mailed free by the Commissioner of Agriculture and by members of Congress The franking privilege is frequently abused As no penalty is attached to the improper use of the frank, it has been recommended that a penalty be imposed by act of Congress. Many public officers are allowed to send their official communications in unstamped envelopes marked "official business."

An unlawful use of such an envelope by one not entitled to the franking privilege subjects the offender to a statutory penalty of $300 See POST OFFICE

FRANKISH VERSION See BIBLE

FRANKL, fran'k'l, LUDWIG AUGUST, RITTER VON HOCHWART (1810–94). An Austrian poet He was born in Bohemia, of Jewish parentage, and was educated in medicine in Vienna, but preferred journalism and literature His *Habsburglied* (1832), a series of ballads in chronological order, placed him among the Romanticists Among his best-known works are *Sagen aus dem Morgenlande* (1834) and the epic *Christoforo Colombo* (1836) In 1856 he established a school in Jerusalem and described the condition of the Orient in *Nach Jerusalem* (1858) and *Aus Aegypten* (1860) Jewish subjects are treated by him in the two poems *Rachel* (7th ed, 1880) and *Der Primator* (1864) and in the historical work *Zur Geschichte der Juden in Wien* (1853) Frankl also took an active interest in the philanthropic work of Vienna and in public affairs, especially in 1848, when the liberal spirit of his poetry made him widely known His collected works, except his satires, appeared in three volumes in 1880

FRANK'LAND, SIR EDWARD (1825–99). An English chemist, born at Churchtown, near Lancaster He was a druggist's apprentice in Lancaster in 1840–45 and then worked in Playfair's laboratory in London (with Kolbe), and, after 1847, in Bunsen's laboratory, and in the University of Marburg (with John Tyndall, who had taught with him the year before at Queenwood College, Hampshire) He became professor of chemistry at Owens College, Manchester (1851), lecturer at St Bartholomew's, London (1857), and professor at the Royal Institution (1863), the Royal School of Mines (1865), and the South Kensington School of Science (1881). He was the first to state clearly and definitely (in 1852) the theory of valency in chemistry. In 1853 he described a regenerative gas burner, of the type commonly called by Bowditch's name With Lockyer, in 1868, he discovered the new element, helium He was knighted in 1897 He wrote *Water Analysis for Sanitary Purposes* (1880), and for many years after 1865 made monthly reports on the London water supply His *Experimental Researches in Pure, Applied, and Physical Chemistry* were published in 1877 Consult the *Autobiographical Sketches* (London, 1902)

FRANKLAND, PERCY FARADAY (1858–) An English chemist, son of Sir Edward Frankland He was born in London and was educated at the University College School, the Royal School of Mines (where he lectured in 1880–88), and the University of Wurzburg He was professor of chemistry at University College, Dundee (1888–94), at Mason College, Birmingham (1894–1900), and at Birmingham University Some of his published work is the joint labor of his wife, Grace Coleridge Toynbee (born 1858), daughter of Joseph Toynbee—notably *Micro-Organisms in Water* (1894) and *The Life of Pasteur* (1897)

FRANK'LIN. Formerly a district of Canada, formed in 1895, and composed of numerous islands north of the mainland, including Banks, Prince Albert, King William, Baffin, Prince of Wales, Melville, North Devon, Bathurst, and others. The area is estimated at about 500,000 square miles. It is mostly within the Arctic circle and nearly destitute of animal and vegetable life The only inhabitants are some Eskimo on Baffin Land In 1905 it was merged into the new Northwest Territories

FRANKLIN A city and the county seat of Johnson Co, Ind, 20 miles south by east of Indianapolis, on the Cleveland, Cincinnati, Chicago, and St Louis and the Pittsburgh, Cincinnati, Chicago, and St Louis railroads and the Indianapolis, Columbus, and Southern Traction Co's electric line (Map Indiana, E 6) It is the seat of Franklin College (Baptist), opened in 1834, and has a masonic home for widows and orphans, a public library, and fine county buildings The city is in an agricultural region, its industrial establishments include a desk factory, elevators, flour, planing, and saw mills, and manufactories of furniture, automobiles, galvanized ware, etc Pop, 1900, 4005, 1910, 4502

FRANKLIN. A city and the county seat of Simpson Co, Ky, 53 miles north by east of Nashville, Tenn, on the Louisville and Nashville Railroad (Map Kentucky, D 6) It has the Franklin Female College and the Southern Kentucky Sanatorium The industrial establishments include flouring mills, a planing mill, a woolen mill, and a tobacco warehouse, etc The water works are owned by the city Pop, 1900, 2166, 1910, 3063

FRANKLIN A town and the parish seat of St. Mary Parish, La, 101 miles by rail west by south of New Orleans, on Bayou Teche, and on the Southern Pacific Railroad (Map Louisiana, D 4) The bayou is navigable for steamers, and the town carries on a considerable trade in cotton, sugar, fruits, etc There are several sugar refineries and saw mills The water works are owned by the town Pop, 1910, 3857

FRANKLIN. A town in Norfolk Co, Mass, including the village of Unionville, 28 miles southwest of Boston, on the New York, New Haven, and Hartford Railroad (Map Massachusetts, E 4). It has an almshouse, a public library costing $250,000, and Dean Academy, an endowed school for both sexes Its manufactures include pianos, printing presses, straw hats, and cotton, woolen, and felt goods Franklin was originally a part of Wrentham and was incorporated as a separate township in 1778 The government is administered by town meetings The water works are owned by the town Pop, 1900, 5017; 1910, 5641

FRANKLIN A city in Merrimack Co, N H., 19 miles north by west of Concord, at the confluence of the Pemigewasset and Winnipesaukee rivers, which here unite in the Merrimack, and on the Boston and Maine Railroad (Map New Hampshire, F 6) Abundant water power has contributed materially to the city's industrial importance There are paper and pulp mills, hosiery mills, foundries, and manufactures of needles, knitting machines, woolen goods, boxes, hack saws, lumber, house finish, etc Franklin is famous as the birthplace of Daniel Webster and contains the New Hampshire Orphan's Home, a public library, and a city hospital It was incorporated as a town in 1828 and in 1895 received a city charter, now in operation, which provides for a mayor, elected annually, and a council of nine members. The city owns and operates its water works. Pop, 1890, 4085, 1900, 5846, 1910, 6132.

FRANKLIN A village in Warren Co, Ohio, 16 miles south of Dayton, on the Cincinnati Northern, the Cleveland, Cincinnati, Chi-

cago, and St Louis, and the Ohio Electric railroads, and on the Big Miami River (Map Ohio, B 6) Paper mills comprise the leading industry The water works are owned by the village Pop, 1900, 2724, 1910, 2659

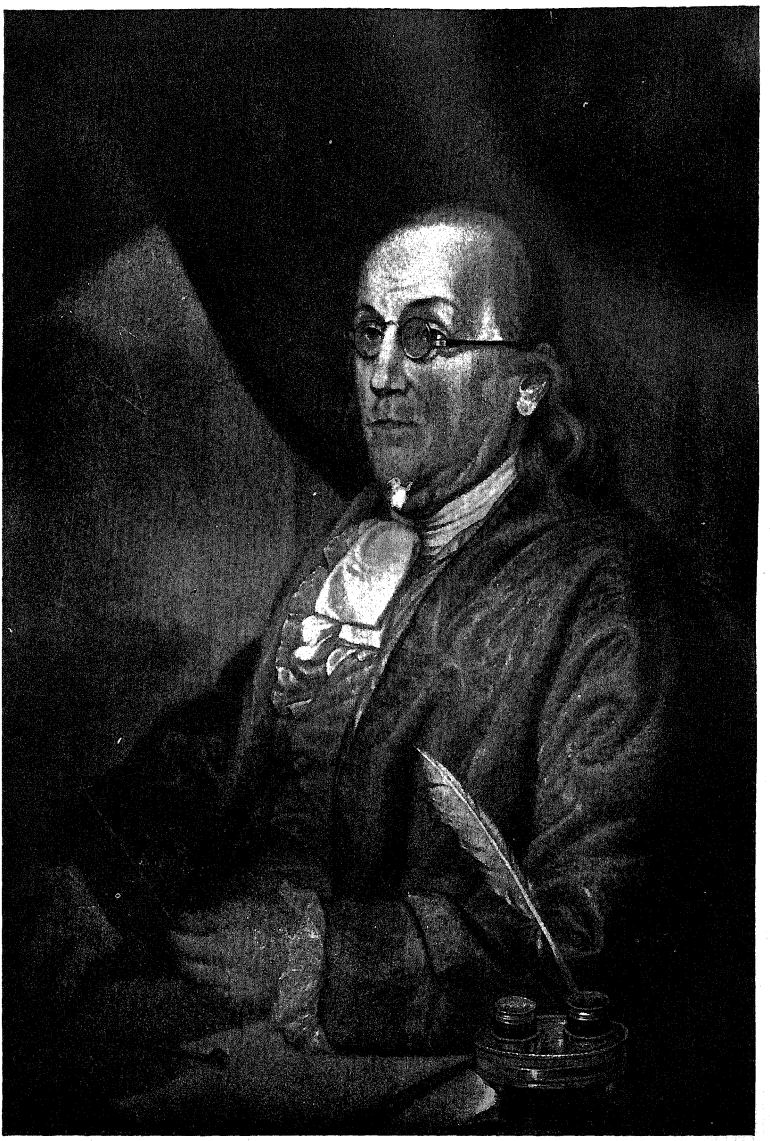
FRANKLIN. A city and the county seat of Venango Co, Pa, 125 miles by rail north by east of Pittsburgh, on the Allegheny River, and on the Pennsylvania, the Erie, the Lake Erie, Franklin, and Clarion, and the Lake Shore and Michigan Southern railroads (Map Pennsylvania, B 3) It has a public library, the Charles Miller Night School, and two fine parks, besides several places of historic interest The centre of the great oil region of the State, Franklin's chief interest is in oil, though there are also flouring mills, machine shops, brickworks, and manufactures of steel castings, tools, manifold papers, and oil-well supplies Franklin was settled about 1753 and was incorporated in 1795 It adopted the commission form of government in 1913 The water works are owned by the city Pop, 1900, 7317, 1910, 9767, 1914 (U S est), 10,811

FRANKLIN. A city and the county seat of Williamson Co, Tenn, 20 miles south by west of Nashville, on the Harpeth River, and on the Middle Tennessee and Louisville and Nashville railroads (Map Tennessee, D 3) It is the seat of the Tennessee Female College, opened in 1856, and the Battle Ground Academy, opened in 1902 A Confederate cemetery and Fort Granger are situated here The town is the centre of a fertile agricultural region and has manufactures of carriages, flour, lumber, mantels, etc Pop, 1900, 2180, 1910, 2924 An engagement between the Federal General Granger and the Confederate General Van Dorn occurred here on April 10, 1863, the latter making the attack and being repulsed; and here, on Nov 30, 1864, was fought the battle of Franklin See FRANKLIN, BATTLE OF

FRANKLIN (from ML *franchilanus*, from *franchus*, free). An English freeholder of former times, who held his lands of the crown free from any feudal servitude to a subject superior. He is one of the characters described by Chaucer In the course of time he lost his dignity, becoming a well-to-do yeoman Consult Chaucer, *Prologue to the Canterbury Tales*, Shakespeare, *Henry IV, Part I* (Act ii, Scene 1), and *Winter's Tale* (Act v, Scene 2)

FRANKLIN, BATTLE OF A sanguinary battle fought at Franklin, Tenn, on Nov 30, 1864, between a Federal army of about 25,000, under General Schofield, and a Confederate army of about 40,000, under General Hood Early in November, 1864, General Schofield, acting under orders from Thomas, took command at Pulaski, Tenn., of a Federal force of about 25,000 On the 21st Hood advanced against this position, and Schofield gradually withdrew before him towards Nashville, under instructions to impede the Confederates until Thomas should have fully prepared himself for action Confederate movements by the rear and by the right flank were balked by Schofield at Columbia and Spring Hill on the 24th and the 29th respectively and by a rapid night's march, in which he passed by the sleeping Confederate army Schofield reached Franklin at dawn of the 30th and, in the absence of pontoon bridges, immediately set about improvising bridges for transferring his army and stores across the Harpeth River He also threw up breastworks on the left bank to meet a possible Confederate attack and stationed General Wagner, with two brigades, somewhat in advance, with instructions to withdraw behind the intrenchment on the approach of the Confederates, without awaiting a general attack Meanwhile Hood, chagrined over the previous day's failure at Spring Hill, had come up and at 4 P M ordered an attack Wagner, imprudently delaying, lost heavily, and his men, enveloped by the Confederate advance, hastily retreated through the Federal centre, which was soon thrown into great confusion General Opdycke, without orders, threw his brigade into the resulting gap and thus, by enabling the Federals to reform, saved the day Thereafter until almost midnight the fighting continued, the Confederates making repeated and desperate assaults only to be beaten back each time with disproportionate loss by the Federals, under the immediate command of Gen J D Cox, General Schofield being on the right bank of the river During the night Schofield withdrew unmolested to Nashville, where he joined Thomas The battle is notable for the remarkable gallantry of the Confederates and the stubborn bravery of the Federals The Federal loss in killed, wounded, and missing was 2326, that of the Confederates, though not accurately known, probably exceeded 6000 Consult Cox, *The Battle of Franklin* (New York, 1897), id, *The March to the Sea, Franklin and Nashville* (ib, 1882), Johnson and Buel, *The Battles and Leaders of the Civil War*, vol iv (ib, 1887), Nicolay and Hay, *Abraham Lincoln A History*, vol x (ib, 1890), Steele, *American Campaigns* (Washington, 1909)

FRANKLIN, BENJAMIN (1706–90). An American statesman, scientist, and author He was born in Boston, Mass, Jan 17, 1706 His father, Josiah Franklin, emigrated to America about 1685 and took up the business of tallow chandler His mother, a second wife, was the daughter of Peter Folger, a leading settler, noted for his philanthropy and tolerance Benjamin, the fifteenth of 17 children, was named after his father's favorite brother and, as the tenth son, was intended as the "tithe for the ministry" Either on account of poverty or an early perceived distaste on the boy's part, the theological idea was given up After a year or more at candle making in his father's shop, Benjamin was apprenticed to his brother James, a printer, and the founder in 1721 of the *New England Courant*, one of the earliest papers in America. While in this office Franklin learned the trade well, read diligently, and found time to write pieces in the style of the *Spectator*, and even ballads, which he had published in the *Courant*, at first anonymously In 1722, for some political opinions, James Franklin was imprisoned a month and forbidden to publish his paper For a while it appeared under Benjamin's name, but there was continual quarreling between the two brothers At last the apprentice broke his indentures and slipped away by sea to New York Finding no work there, he went on to Philadelphia, where he arrived, October, 1723, friendless and almost penniless Though only 17 years old, he was a good printer and of pleasing address and quickly found friends, and began to work for Samuel Keimer, a printer recently emigrated from London. In 1724 Sir William Keith, the Governor, induced him to go to England to buy type for a printing shop of his own, promising him a letter which would



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BENJAMIN FRANKLIN

FROM THE ENGRAVING BY MAX ROSENTHAL OF THE PORTRAIT BY C. W. PEALE

give him aid in the way of money Franklin reached England, found his patron's promises worthless, and had to shift for himself For a year and a half he maintained himself as a printer, gaining some notoriety by a free-thinking pamphlet which he printed, but afterward repudiated as immature He also got considerable reputation in London for his prowess as a swimmer Returning to Philadelphia in October, 1726, he was clerk for a while in a newly started dry-goods shop He soon got back to printing, however, first with his old employer, Keimer, and then in an independent shop for which he furnished skill and energy and his partner, Hugh Meredith, the money In 1729 Franklin got control of the *Pennsylvania Gazette*, which Keimer had started, and the excellence of the printing and the spirit of the writing won him a competence and high consideration throughout the Colonies On the dissolution of the partnership in 1730 Franklin took over the business In 1730 he married Miss Deborah Read, the daughter of the man whom he had lodged with on his first coming to Philadelphia From this time on he was engaged almost constantly in some sort of public activity, and his achievements were varied In 1731 he began the Philadelphia Library, chartered in 1742, said to be the first and the model of the American system *Poor Richard's Almanac* he first published in 1732, under the pseudonym of "Richard Saunders," and for 25 years his witty, worldly-wise sayings in this publication were very influential in molding the new American character. In 1736 he became clerk of the General Assembly, and the next year was appointed postmaster for Philadelphia About this time he also organized for the city a police force and a fire company In 1743 he broached a plan for an academy, which was later adopted and developed into the University of Pennsylvania

Soon after his return from England he started a debating society for the "Discussion of Morals, Politics, and Natural Philosophy" This society in 1743 developed into the American Philosophical Society Always interested in scientific studies, he invented an "open stove for better warming of rooms," a stove which is still in use both in this country and in Europe While in Boston in 1746 he met a Dr Spence, who had lately arrived from Scotland, and saw him perform a few electrical experiments, which interested him greatly The next year the Library Company of Philadelphia received from Mr Peter Collinson of London a glass tube with directions for performing electrical experiments Franklin at once began his scientific investigations, and practically all his work was done between this time and his departure for England in 1757 His important papers took the form of letters to Mr Collinson and to a Mr Kinnersley, who had been associated with him in his early experiments, but later moved to Boston Franklin's first original experiments were with the action of fine points with reference to electrical charges, a matter which he explained fully He next discussed the theory of the Leyden jar and gave his explanation in words which are practically satisfactory to-day He became convinced, as others had before, that lightning was an electrical phenomenon and immediately proposed a method for testing the matter His plan was published in London and was carried out in France and in England before he himself performed his famous kite experiment He proposed the construction of lightning rods having sharp points for the protection of houses He was deeply interested in the meaning of the two kinds of electricity, positive and negative, and offered as his explanation what is called the "one-fluid theory" It is interesting to note that this theory comes nearer to our present conceptions of electricity than any of the other theories advanced in the past This theory in brief is as follows Every unelectrified body is supposed to contain its *normal* quantity of "electrical fluid", a body is positively electrified when it contains an excess of this, and negatively electrified when it has lost a part of its normal quantity

The extraordinarily widespread interest in the work of Franklin was a natural consequence of the clearness of his writing, for in this respect he was in marked contrast to most of his contemporaries Franklin's scientific views won their way through surprised incredulity into acceptance both in France and England Honorary degrees were voted to him by St Andrews, 1759, and by Oxford, 1762, the freedom of the city of Edinburgh was given him in 1759, and he became F R S and was awarded the Copley gold medal in 1775

In 1753 Franklin was appointed Postmaster-General for the Colonies In 1754 he was commissioner from Pennsylvania at the Intercolonial Congress which met at Albany to take measures in view of the threatened French and Indian War, and he proposed a plan combining local independence with union (See ALBANY CONVENTION) It seems probable that if this plan had been followed many of the causes which led to the Revolution would have been avoided, and perhaps the Revolution itself When the French and Indian War came on, Franklin assisted Braddock greatly, giving his personal security for supplies and transportation furnished by the Pennsylvania farmers The descendants of William Penn, the proprietors of the Colony, refused to allow their private lands to be taxed for the support of the English troops, and in 1757 Franklin was sent to England to petition the crown against this This mission conducted satisfactorily, he remained in England as the leading representative for the Colonies In 1766 occurred his famous examination before the House of Commons as to the effects of the Stamp Act, and his influence helped to secure the repeal of the act, but he did not fully appreciate the depth of the feeling in America in regard to taxation, and when he urged the colonists to pay the later small tax on tea, he was roundly charged with lack of patriotism In 1774 the publication of the so-called Hutchinson letters, which he had been intrusted with, and which it was to the interest of the Tory party not to have published, made him unpopular in England In 1775, seeing war to be inevitable, he returned and was immediately chosen a delegate to Congress. He was on the committee to draft the Declaration of Independence and was one of the signers

During the Revolutionary War Franklin represented American interests in Europe and particularly in France to which he was appointed a commissioner in September, 1776 His scientific reputation, his dignity of character, and his charm of manner made him extremely popular in French literary, social, and political circles, and his wisdom and fertility of resource secured for the government aid and concessions which no

other man could possibly have obtained He lent efficient aid to the operations of the American navy and especially of John Paul Jones Against the vigorous opposition of Necker, his matchless diplomacy got for a country that was bankrupt and almost hopeless loans amounting to many millions of francs After the defeat of Burgoyne Franklin was received officially, and on Feb 6, 1778, he concluded a treaty of offensive and defensive alliance with France On Nov 30, 1782, he signed the preliminary articles of peace, and the next year (Sept 3, 1783) he was one of the signers of the definitive Treaty of Paris

In September, 1785, his request to be allowed to return home was granted by Congress, but he had scarcely reached Philadelphia before he was chosen a member of the Executive Council, and soon afterward (October, 1755–October, 1788) he held the position which now corresponds to the governorship In May, 1787, he was a member of the convention to form a national constitution, and in spite of his advanced age was vigorously active in the proceedings He was deeply interested in all schemes of usefulness and philanthropy, and one of his last public acts was to sign a memorial to Congress, Feb 12, 1790, as president of the Pennsylvania Society for the Abolition of Slavery The last two years of his life were spent in severe pain of body, but in activity of mind He died April 17, 1790 His grave is in the churchyard at Fifth and Arch streets, Philadelphia Upon his death Congress passed resolutions of mourning, and the National Assembly of France, on the motion of Mirabeau, put on mourning for three days.

Franklin's greatest service to America was undoubtedly due to his skill in diplomacy His public spirit and devotion were reenforced by powers of mind and wisdom that made him practically unrivaled To his common sense, sagacity, and industry he added great firmness of purpose, a matchless tact, and a broad tolerance In science, his electrical discoveries, with the invention of the lightning rod, are very important, and, besides these, many other discoveries and inventions are to be credited to him His literary reputation rests chiefly on his unfinished *Autobiography*, a book which is an epitome of his life and character, expressed in wonderfully clear and simple style This famous book had a singular fortune Franklin's grandson tried to edit it to suit his own taste, which was less frank than Benjamin's He published what pretended to be a correct version in London, 1817, but a French version, from another manuscript, had appeared in 1791 In 1867 John Bigelow secured in France the original manuscript, which Temple Franklin had disposed of The correct version of the *Autobiography* then appeared in 1868 Franklin's newspaper and his almanac were the organs through which he spread his practical morality and wisdom, and they and his letters reflect his distinctively American humor He was never deliberately an author, all his writing was done with a practical aim and derives its value largely from the accuracy with which it reflects his character He was remarkably deficient in poetic imagination and in ability to appreciate the spiritual side of man's nature For a while during his youth he was a skeptic, and he was never an orthodox Christian, but his attitude when he died was such that to-day he would be classed with the "liberal Christians"

In person Franklin was about 5 feet, 9 or 10 inches in height and well built His complexion was fair, his eyes gray, and his manners extremely affable and winning None of his descendants bear his name, though there are many descendants of his daughter, Mrs Bache

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FRANKLIN, Edward Curtis (1862–). An American chemist, born at Geary City, Kans In 1888 he graduated at the University of Kansas, where he served as an assistant in 1888–93, associate professor in 1893–99, and professor of physical chemistry from 1899 to 1903, and he also studied at the University of Berlin and at Johns Hopkins (Ph D, 1894) At Leland Stanford Junior University he was associate professor in 1903–06 and professor of organic chemistry after 1906 In 1911–13 he was professor of chemistry and chief of the division of chemistry of the United States Public Health and Marine Hospital Service, he served on the United States Assay Commission in 1906, and published papers on liquid ammonia as an electrolytic solvent, on the ammonia system of acids, bases, and salts, and on nonaqueous solvents

FRANKLIN, Sir John (1786–1847) An Arctic explorer, born at Spilsby, Lincolnshire, England His father had intended him for the church, but, giving way to the boy's strong desire to follow the sea, secured for him a midshipman's appointment in the navy in 1800 He was first attached to the *Polyphemus*, with which he served in the Baltic, and took part in the battle of Copenhagen, April 2, 1801 His next service was with the *Investigator*, which, under command of Capt Matthew Flinders, was sent to survey the Australian coast Returning to England, he was assigned as signal officer to the ship of the line *Bellerophon*, in which, in 1805, he participated in the battle of Trafalgar In 1808 he became a lieutenant and in 1814 accompanied the British expedition against New Orleans, in the attack upon which he was wounded Franklin's career as an Arctic explorer began in 1818, with his appointment to the command of the *Trent*, a brig that had been fitted out to accompany Captain Buchan in the *Dorothea* to sail to the north of Spitzbergen and cross the Polar Sea by that route The at-

tempt proved a failure, but Franklin's scientific knowledge and enthusiastic interest in Polar explorations became known, and in the following year he was placed in command of an expedition which was destined to explore the northern coast of the continent eastward from the Coppermine River, acting in conjunction, if possible, with Lieutenant Parry, who was dispatched with two vessels to Lancaster Sound Wintering at Fort Enterprise, Franklin in the summer of 1821, by a journey of 900 miles, traced the continental coast of North America from the mouth of the Coppermine eastward to Point Turnagain (190° 15′ W), from which place he turned westward the same day that Parry, unsuccessful, sailed from Repulse Bay for England Franklin was forced to return across the Bad Lands under such adverse conditions as fully tested his masterful and resolute personality Of his party of 20, 10 perished—two by violence and eight by cold, hunger, and exhaustion On his return to England he was promoted to the rank of captain and was elected a fellow of the Royal Society In 1825 Franklin led an expedition which attempted, via the Mackenzie River, to reach the northwest extremity of the continent, and by surveying the coast between the Mackenzie and Coppermine fill in the unknown parts of the continental coast Wintering at Fort Franklin, the party reached the Mackenzie delta July 3, 1826 Dr Richardson successfully surveyed the coasts to the east, discovering Wollaston Land Franklin went to the west to connect his survey with Beechey in Bering Strait, but bad ice made success impossible Franklin turned back, August 16, from Return Reef (148° 52′ W), 160 miles east of Point Barrow The magnitude and extent of the discoveries of Franklin's two expeditions are shown by the statement that of the 72° of longitude of the unknown coast he had explored more than 40° He returned to England in September, 1827 In 1829 he was knighted, and in recognition of his services to geographical science received the honorary degree of D C L from Oxford and the gold medal of the Geographical Society of Paris From 1830 to 1833 Franklin commanded the *Rainbow* frigate on the Mediterranean station and won the appreciation of the Greeks and a decoration from King Otho for services rendered them during their war of liberation From 1836 to 1843 Sir John was Lieutenant Governor of Van Diemen's Land, now Tasmania, and the period of his administration was one of the greatest progress the colony had ever known On his return to England he found that an expedition was being planned by the Admiralty to make another attempt to discover the Northwest passage While Sir John would not solicit the command, he promptly accepted it when offered It consisted of the *Erebus* and *Terror*, with 129 officers and men, and left England on May 18, 1845, with the intention of sailing direct to Cape Walker and thence southward and westward in the direction of Bering Strait, as far as the ice and land would permit The ships were last seen on July 26, 1845, by a Scottish whaler in Baffin Bay The winter of 1847–48 passed without news from the expedition, and in the spring of 1848 began a remarkable series of relief and search expeditions from both England and the United States, numbering 39 all told up to 1857 and involving an expenditure of over a million pounds sterling On Aug 27, 1851, Captain Penny found on Beechey Island the graves of three of Franklin's sailors who had died in 1846, this was the first definite information of the expedition In April, 1854, while exploring Melville Peninsula for the Hudson's Bay Company, Dr John Rae learned from the Eskimos of Boothia Land that Franklin's ships had been abandoned in 1850, the report being confirmed by numerous relics (Franklin's silver) obtained from the natives It was not until 1859 that the expedition sent out in 1857 by Lady Jane Franklin (1792–1875), under Captain McClintock, in the *Fox*, decided the fate of Sir John and his comrades and at the same time established the fact that he had actually achieved what he had set out for, the discovery of the long-sought Northwest passage From the brief record found by Hobson of McClintock's party it was learned that, after ascending Wellington Channel, which separates North Devon and Cornwallis Island to lat 77° N, and returning by the west side of Cornwallis Island, the ships had wintered, in 1845–46, at Beechey Island, on the southwest coast of North Devon (in lat 74° 43′ 28″ N), that in the fall of 1846 an attempt had been made to reach the North American coast by sailing through the channel which separates Prince of Wales and North Somerset Islands, but that progress had been arrested by heavy ice when within 12 miles of the north end of King William's Land, where the party remained all winter, and where on June 11, 1847, Sir John Franklin had died, and that the ships were abandoned there by Captain Crozier and the 105 survivors of the party, who on April 26, 1848, started southward over the ice for the Great Fish River, on the continent There are grounds for the belief that 79 perished on the journey, and that the remaining 29 died of starvation near Montreal Island Franklin was promoted to be rear admiral in 1852, five years after his death Sir John Franklin published the results of his first two Polar expeditions under the titles *Narrative of a Journey to the Shores of the Polar Sea in the Years 1819–22* (1823) and *Narrative of a Second Expedition to the Shores of the Polar Sea in 1825–27* (with Dr Richardson) (1828) Consult also McClintock, *Narrative of the Fate of Sir John Franklin* (Boston, 1860), Osborn, *The Career, Last Voyage and Fate of Sir John Franklin* (London, 1860), Beesly, *Sir John Franklin* (ib, 1881), Markham, *The Life of Sir John Franklin, and the Northwest Passage* (ib, 1891), Traill, *Life of Sir John Franklin* (ib, 1896)

FRANKLIN, Samuel Rhoads (1825–1909) An American naval officer, brother of Gen W B Franklin He was born in York, Pa, entered the United States navy as an acting midshipman in 1841, participated in the capture of Monterey, Cal, during the Mexican War, was assistant professor of ethics and English at the United States Naval Academy in 1854, and in September, 1855, became a lieutenant He became lieutenant commander in July, 1862, served in the Western Gulf Blockading squadron in 1863, and as assistant to Commodore Palmer at New Orleans in 1863–64, and in the spring of 1865 was on the staff of Acting Rear Admiral Thatcher in Mobile Bay In 1873 he was promoted to be captain He was chief of staff to Admirals Case and Worden; served for a time in the European squadron, was president of the board of examiners for the promotion of officers in 1877, was hydrographer to the Bureau of

Navigation from 1877 to 1880; became a commodore in May, 1881, was superintendent of the Naval Observatory in 1884–85, was promoted to be rear admiral in January, 1885, and commanded the European station from 1885 to 1887, when he retired In 1889 he was president of the International Marine Conference He published *Memories of a Rear-Admiral* (New York, 1898)

FRANKLIN, STATE OF See TENNESSEE, NORTH CAROLINA

FRANKLIN, WILLIAM (1729–1813) A Colonial governor of New Jersey He was born in Philadelphia and was a natural son (probably by Barbara, a domestic) of Benjamin Franklin, who acknowledged him and brought him up in his household During King George's War William served in the Pennsylvania line on the Canadian frontier and became a captain before he was of age In 1754–56 he was comptroller of the general post office and for a time was clerk of the provincial assembly Going with his father to England, he was there admitted to the bar (1758) and in 1762 was appointed Governor of New Jersey, where his time-serving character and his shift from the Whig to the Tory party disgusted the colonists During the Revolutionary War he remained loyal to England and was kept under surveillance by the patriots He gave his word that he would not leave the province, but in consequence of summoning a meeting of the old Colonial assembly, he was arrested and sent to Connecticut and kept a prisoner for two years In November, 1778, he was exchanged and took refuge in New York In 1782 he went to England, where he died. His political course caused an estrangement between him and his father, though they were partially reconciled in 1784 All his lands in Nova Scotia Dr Franklin left to William It was for William that his father began in 1771 his *Autobiography* His son lost the manuscript during the war, and it was found by a friend, who urged the father to continue it William's son, William Temple Franklin, edited Benjamin Franklin's works Consult F B Lee, *New Jersey as a Colony and as a State* (4 vols, New York, 1902), E J Fisher, *New Jersey as a Royal Province*, 1738–76 (ib, 1911), *Letters from William Franklin to William Strahan*, ed by Hart (Philadelphia, 1912)

FRANKLIN, WILLIAM BUEL (1823–1903). An American soldier He was born at York, Pa, graduated at West Point in 1843 (first in the class in which Grant's rank was twenty-first), and for three years was engaged in topographical work In the Mexican War he accompanied General Wood on his march through Coahuila He was assistant professor of natural and experimental philosophy at West Point from 1848 to 1852, and thereafter was on various engineering works, becoming chief of the Construction Bureau of the Treasury Department in March, 1861. On May 17, 1861, he was promoted brigadier general of volunteers, in which capacity he served in the first battle of Bull Run and commanded successively a division and the Sixth Army Corps of the Army of the Potomac in the Peninsular campaign under General McClellan On June 30, 1862, he was brevetted brigadier general in the regular service and on July 4 was promoted major general of volunteers He commanded the Sixth Corps of the Army of the Potomac in the Maryland campaign, being in command in the battle of Crampton's Gap, and participating in the battle of Antietam, and commanded the left grand division of the Army of the Potomac in the Rappahannock campaign, participating as such in the battle of Fredericksburg, where an accusation (apparently ill founded) of disobeying Burnside's orders caused his temporary relief from active service In 1864 he served in the Department of the Gulf, where for some months he commanded the Nineteenth Army Corps and the troops in western Louisiana, and on April 8 was wounded at Sabine Cross Roads In 1863 Governor Curtin of Pennsylvania, in an effort to escape a renomination, attempted unsuccessfully to secure General Franklin's nomination for that office From December, 1864, to November, 1865, he was president of the board for retiring disabled officers, at Wilmington, Del On March 13, 1865, he was brevetted major general in the regular army He resigned from the volunteer service on Nov 10, 1865, and from the regular army on March 15, 1866 He became vice president of the Colt's Firearms Manufacturing Company at Hartford, Conn, in November, 1865, was president of the board of managers of the National Home for Disabled Volunteer Soldiers from 1880 to 1899, and in 1889 was commissioner general of the United States to the Paris Exposition Consult Greene, *Franklin and the Left Wing at Fredericksburg* (Hartford, 1900)

FRANKLIN, WILLIAM SUDDARDS (1863–) An American physicist and electrical engineer, born at Geary City, Kans He graduated at the University of Kansas in 1887 After further studies in Germany and at Harvard University he was appointed assistant professor of physics at the University of Kansas (1887) From 1892 to 1897 he was professor of physics and electrical engineering at Iowa State College, and in 1897 he was appointed to the corresponding chair at Lehigh University In 1903 he became professor of physics He is joint author of *The Elements of Alternating Currents* (1899, 2d ed, 1901), *Elements of Electrical Engineering* (2 vols, 1906), *Dynamo Laboratory Manual* (1906), *The Elements of Mechanics* (1907), *Dynamos and Motors* (1909), and is sole author of *Electric Lighting and Miscellaneous Applications of Electricity* (1912), and a volume of essays, *Bill's School and Mine* (1913).

FRANKLIN AND MARSHALL COLLEGE An educational institution under the care of the Reformed church, established by the union of Franklin College and Marshall College Franklin College was organized at Lancaster, Pa, in 1787, and named in honor of Benjamin Franklin, one of its benefactors, Marshall College, named after John Marshall, was established by the Reformed church at Mercersburg, Pa, in 1836, in connection with its theological seminary In 1852 the two institutions were consolidated at Lancaster under a new charter A preparatory academy is affiliated with the college The value of the college buildings and grounds is estimated at $476,375, the endowment is $428,604, and the annual income $40,000. Degrees are conferred in the arts In 1914 the students numbered 568, of whom 250 were in the preparatory department Consult Dubbs, *History of Franklin and Marshall College* (Lancaster, Pa, 1903) The president in 1914 was H H Apple, D.D, LL D

FRANKLIN COLLEGE. An educational institution founded by the Baptists at Franklin,

lnd, in 1834 The college offers courses in letters, science, and the humanities, leading to appropriate degrees A preparatory school formerly a part of the institution was discontinued in 1907 The student enrollment in 1914 was 207, and the faculty numbered 16 The total value of the college property was in 1914 over $500,000, of which considerably more than one-half represents productive funds The institution is on the Carnegie Foundation The library contains about 20,000 volumes The president in 1914 was Elijah D Hanley, D D

FRANKLIN INSTITUTE, THE, OF THE STATE OF PENNSYLVANIA FOR THE PROMOTION OF THE MECHANIC ARTS A learned institution at Philadelphia, Pa, established in 1824 for the purpose of disseminating knowledge of the arts and sciences, and combining in one organization features of the mechanics' institutes and of the exclusive scientific societies The objects of the institute are attained by means of lectures, reports, a journal, libraries, exhibitions, and school instruction The lectures, originally giving systematic courses of instruction, now have the object of presenting the latest advances in art and sciences, in the form of popular lectures and of strictly technical discussions before the sections into which the institute is divided In 1834 a volunteer committee was formed to examine and report on new machines, inventions, and discoveries, the committee consists of 60 members, whose labors have given a notable reputation to the institute The publication of a journal was begun in 1826 and has continued uninterruptedly it is issued monthly and contains the record of the institute's work and contributions relating to the growth of science and American industries The library, devoted exclusively to science and the useful arts, contains (1914) about 64,169 volumes, 48,000 pamphlets, besides maps, charts, and photographs, and has important collections of American, British, French, German, Swiss, Russian, and Austrian patent records, also complete series of reports on public works. In 1824 the institute held the first exhibition of American manufactures and has since held 29 exhibitions, the last in 1899 It grants medals, premiums, and certificates for notable inventions A school of mechanical and architectural drawing was established in 1824 and is still maintained, there are also night schools of machine design and naval architecture A school for instruction in English and ancient and modern languages was established in 1826 and became the model on which the Central High School of the City of Philadelphia was founded It was abandoned when the public high schools were established Membership in the institute is open to all persons of legal age on payment of yearly dues Its building is situated at 15 South Seventh Street Consult W. H Wahl, *Franklin Institute A Sketch of its Organization and History* (Philadelphia, 1895)

FRANK'LINITE. An iron-black, slightly magnetic mineral with a metallic lustre, consisting of ferric and manganic oxides in combination with ferrous, manganous, and zinc oxides, of rather complex composition and varying relative quantities. It crystallizes in the isometric system, occurring chiefly in octahedral crystals as well as in rounded grains and in compact masses In Germany it is also found in the form of cubic crystals. Its principal occurrence in the United States is in Sussex Co., N. J., at Franklin Furnace, Mine Hill, and at Sterling Hill, being found in veins of limestone in zinc mines Owing to the manganese that it contains, it is used as an ore for making Bessemer steel

FRANKLIN'S TALE, THE One of Chaucer's *Canterbury Tales* It narrates the adventures of the faithful Dorigen, as they are recounted in Boccaccio's *Decameron*, in the fifth story of the tenth day, although the franklin claims his story is taken from a Breton lay The narrator himself is a jolly open-handed ex-sheriff and knight of the shire

FRANK'MAR'RIAGE (*liberum maritagium*) A species of estate tail existing by the common law of England It arose where a man, on the marriage of his daughter or other female relative, gave lands to the bridegroom, with a provision limiting the inheritance to the issue of the marriage It was, therefore, a form of fee tail special This tenure was called *liberum maritagium*, to distinguish it from other species of estate tail Four things were necessary to a gift in frankmarriage (1) that it be in consideration of a marriage, (2) that the woman with whom it is given be of the blood of the donor, (3) that the donees should hold of the donor (hence a gift in frankmarriage by a subject became impossible after the Statute *quia emptores*), (4) that the donees should hold for four generations Therefore a reservation of a remainder to a stranger to take effect within four generations was a void limitation upon a gift in frankmarriage The estate has long been obsolete

FRANK'PLEDGE. An ancient principle of English law, prevailing before the Norman Conquest, whereby the members of every tithing or community of freemen were responsible for the good conduct of each other This responsibility consisted in every 10 men in a village being answerable each for the others, so that, if one committed an offense, the other nine were liable for his appearance to make reparation Should the offender abscond, the tithing, if unable to clear themselves from participation in the crime, were compelled to make good the penalty This law has been ascribed to Alfred the Great, but it would appear to have been in existence at a much earlier period Mr Hallam observes "The peculiar system of frankpledges seems to have passed through the following very gradual stages At first an accused person was bound to find bail for standing his trial At a subsequent period his relations were called upon to become securities for payment of the compensation and other fines to which he was liable, they were even subject to be imprisoned until payment was made, and this imprisonment was commutable for a certain sum in money The next usage was to make people already convicted, or of suspicious repute, give securities for their good behavior It is not till the reign of Edgar that we find the first general law, which places every man in the condition of the guilty or suspected, and compels him to find a surety who shall be responsible for his appearance when judicially summoned. This is perpetually repeated and enforced in later statutes during his reign and that of Ethelred Finally, the laws of Canute declare the necessity of belonging to some hundred and tithing, as well as of providing sureties" (*Middle Ages*, ii, 80.)

The *court of frankpledge*, or *court leet*, was a court of record held once in the year, within a particular hundred, lordship, or manor, before

the steward of the leet The business of this court was to present by jury all crimes committed within their jurisdiction and to punish all trivial misdemeanors This court has practically fallen into desuetude, and the business is discharged by the justices of the peace at general and petty sessions Originally the business of the court of frankpledge was confined to taking securities or free pledges for every person within the jurisdiction, but this practice having fallen into disuse, the court gradually acquired a criminal jurisdiction concurrent with that of the sheriff's tourn See COURT BARON, COURT LEET, MANOR

FRANKS, THE The name borne by a confederation of Germanic tribes which appeared on the lower and middle Rhine in the third century after Christ and subsequently overthrew the Roman power in Gaul The name is first encountered about the year 240 Many attempts have been made to identify them with earlier tribes, but there is no foundation for the surmises which have been accepted as facts As early as the beginning of the fourth century they had established themselves in what is now Brabant Quite early they became separated into two distinct groups—the Salian Franks, who dwelt on the lower stretches of the Rhine and its affluents, and whose name was formerly supposed to have been derived from the river Yssel or Saal, but is now connected by some with their home on the seashore, and the Ripuarian Franks or Riparii, whose territories lay on both banks of the Rhine along its middle course The Salian Franks were defeated by Julian in 358 and became allies of the Romans, who intrusted to them the defense of the border During the first decade of the fifth century the Salian Franks, carried away by the onrush of the other Germanic nations into Gaul, turned upon the Roman provinces, captured Treves, and soon became the masters of a large extent of territory on the Meuse and the Scheldt, acknowledging, however, the suzerainty of the Romans They fought under Aetius against Attila on the Catalaunian Fields, in 451, and remained on friendly terms with the Romans till after the fall of the Western Empire

The real greatness of the Franks dates from the Salian Clovis or Chlodwig (481–511), a descendant of the fabled Meroveus, who in 486 overthrew the Roman patrician Syagrius at Nogent, near Soissons, and 10 years later vanquished the powerful confederacy of the Alemanni The Burgundians, the Visigoths of Aquitaine, and the Ripuarian Franks were likewise subjugated, and the limits of the Frankish kingdom were extended from the Pyrenees to Friesland and from the Atlantic to the Main Under the influence of his wife, Clotilda, Clovis had accepted Athanasian Christianity in 496, and in his campaigns against the Arian Goths and Burgundians he acted in part as the champion of orthodoxy, thus marking the beginning of the close connection between the Frankish monarchy and the Roman Catholic church After the death of Clovis the kingdom was divided among his four sons Theodoric ruled at Metz, Chlodomer at Orléans, Childebert at Paris, and Clotair at Soissons Thuringia, Burgundy, and Provence were acquired before 558, in which year Clotair became sole ruler of all the Frankish lands After Clotair's death, in 561, the kingdom was again divided among his four sons Austrasia, with a population predominantly Germanic, fell to Sigebert, who made his capital at Metz, Neustria, comprising part of the Gallo-Roman provinces, was assigned to Chilperic, with his capital at Soissons, Aquitaine fell to Charibert, Burgundy, with its capital at Orléans, was ruled by Guntram In 567 Charibert died, and his dominions were divided among his brothers The period that follows is one of internecine strife among the descendants of Meroveus, marked by the foulest crimes and excesses and resulting in the decay of the Merovingian power In the prevailing anarchy the great nobles who had been intrusted with the government of the provinces seized the opportunity to make themselves virtually independent and their offices hereditary (See BRUNHILDA, FREDEGUNDA, MEROVINGIANS) Clotair II in 613 once more reunited the lands of the Frankish crown, but the kings from this time ceased to exercise any influence, and the real power passed into the hands of the great officers of state—the chamberlain, the keeper of the seal, and chief of all the mayor of the palace (*majordomus*) This office existed in all three of the Frankish kingdoms, but it was in Austrasia that a powerful family arose which held exclusive possession of the mayoralty for more than 100 years, ruling as monarchs in fact, if not in appearance This was the race of the Carolingians (q v) Pepin of Landen was *majordomus* of Austrasia under Dagobert I (628–638) and was succeeded by his son Grimoald, who died in 656 Thirty years of confusion followed, during which the Frankish lands were repeatedly portioned out and reunited, until, in 687, Pepin, frequently called Pepin of Héristal, the Austrasian mayor of the palace, overthrew the forces of Neustria and Burgundy in the battle of Testry, and thenceforth ruled as the *majordomus* of a united Frankish kingdom His son, Charles Martel (714–741), extended the frontiers of the kingdom in the east and in 732 repelled the tide of Saracen invasion in the battle of Tours or Poitiers Charles's son, Pepin the Short, ruled in conjunction with his brother Karlmann till 747, and after that, alone In 751 Childeric III, the last of the Merovingians, was deposed, and Pepin ascended the throne with the consent of the Pope Under Charles the Great (q v), the son of Pepin, the Frankish power attained its greatest development Germans and Latins were united under Charles's sway, which extended from the Ebro to the Eider and from the North Sea to Croatia and Slavonia The most powerful monarch in Europe, he became also the secular head of the church, continuing in this manner the tradition of the old Roman Empire His coronation as Roman Emperor took place in 800 Charles's successor, Louis the Pious, showed himself unequal to the task of holding together the huge empire which his father had created Civil strife disturbed the last years of his reign In 841, the year after his death, his sons, Lothair, Louis the German, and Charles the Bald, fought the decisive battle of Fontenay, and two years later, at Verdun, the Frankish Empire was partitioned among them (See VERDUN, TREATY OF) This marks the virtual dissolution of the Frankish monarchy, though Charles the Fat succeeded for a moment (884–887) in reestablishing the Empire Its place is henceforth taken by the nations of France, Germany, and Italy

The rôle played by the Franks in the history of Europe was one of capital importance Of

all the barbarian peoples they showed themselves the most capable of assimilating the Roman culture of the countries which they conquered Civilized, they became in turn the civilizers of the German stocks which had remained in their homes beyond the Rhine Charles's campaigns against the Saxons carried Christianity into northern Germany The elaborate machinery of government which he set up within the Empire established order and respect for the law in Europe, after such a manner as had not been known since the best days of the Roman Empire Unlike the absolutism of Rome, however, the Frankish monarchy knew how to reconcile Imperial power with the rights of the subjects, as was shown in the retention of the national and local assemblages of freemen or representatives of freemen Frankish law influenced profoundly the legal systems of all the nations of western and central Europe (See SALIC LAW) Most important of all, however, was the close connection between the Frankish monarchy and the Catholic church The donations of Pepin and Charlemagne and the establishment of a new Roman empire may be said to have determined the general features of the political history of Europe during the Middle Ages Consult Emerton, *Introduction to the Study of the Middle Ages* (Boston, 1895), Thierry, *Récits des temps mérovingiens* (Paris, 1882), Favre, *L'Empire des Francs* (ib, 1888), Fustel de Coulanges, *Histoire des institutions politiques de l'ancienne France–l'invasion germanique* (ib, 1891), Arnold, *Fränkische Zeit* (Gotha, 1883), Waitz, *Deutsche Verfassungsgeschichte* (Kiel, 1882), Sergeant, *The Franks* (New York, 1898), Mullenhof, *Deutsche Altertumskunde* (5 vols, Berlin, 1891–1906), Lamprecht, *Fränkische Wanderungen und Ansiedelungen* (Aix-la-Chapelle, 1882), Wietersheim, *Geschichte der Völkerwanderung* (2d ed, 2 vols, Leipzig, 1880–81), Hodgkin, *Italy and her Invaders*, vols vii, viii (Oxford, 1899), Schultze, *Deutsche Geschichte von der Urzeit bis zu den Karolingern*, vol ii (Stuttgart, 1896), *The Cambridge Mediæval History*, vols i, ii (New York, 1911–13)

FRANKS, SIR AUGUSTUS WOLLASTON (1826–97) An English archæologist He was born in Geneva, Switzerland, and was educated at Eton and at Trinity College, Cambridge He was long associated with the British Museum as custodian of the department of British and mediæval antiquities and ethnography During the last five years of his life he was president of the Society of Antiquaries, with which he had been closely identified for many years His knowledge of Oriental and mediæval ceramics, jewelry, and objects of art was most extensive, and valuable collections which he made in all these branches came into the possession of the British Museum In the department of Renaissance art he was also an acknowledged authority His publications include *Book of Ornamental Glazing Quarries* (1849), *Examples of Ornamental Art in Glass and Enamel* (1858), *Himyaritic Inscriptions from Southern Arabia* (1863), *Catalogue of Oriental Porcelain and Pottery* (1876–78), *Japanese Pottery* (1880), *Catalogue of a Collection of Continental Porcelain* (1896)

FRANQUEVILLE, PIERRE See FRANCHEVILLE

FRANSCINI, fran-shē'nē, STEFANO (1796–1857) A Swiss political economist and statistician, born at Bodio in the Canton of Ticino In 1829 he worked for constitutional reform in Ticino In 1830 he was elected chancellor of the canton, and he was reelected in 1844 In 1848 he was elected member of the Federal Council He did much for Swiss education, notably in the Zurich Polytechnic In his *Statistica della Svizzera* (1827), *Statistica della Svizzera italiana* (1837–39), and *Uebersichten der Bevölkerung der Schweiz* (1851), he may be said to have laid the foundation of statistical science in Switzerland He also wrote *Der Kanton Tessin* (1835) Consult the sketch by Gfeller (Bern, 1898)

FRANSECKY, frans'kī, EDUARD FRIEDRICH VON (1807–90) A German general, born at Gedern, Hesse He entered the Prussian army in 1825 and in 1843 was called to the general staff He fought with distinction in the Danish War of 1848 and in the Austro-Prussian War of 1866, where by his obstinate resistance against powerful odds he helped to decide the engagement at Munchengratz, and also took a prominent part in the battle of Sadowa As commander of the Second Army Corps during the War of 1870–71, he succeeded, after a forced march, in reaching the battlefield of Gravelotte in time to attack the heights of Point-du-Jour with the First Army On December 1 he received command of the German forces between the Seine and Marne rivers and on the following day repelled General Ducrot's attempt to break through the lines at Champigny and Brie He was the chief adviser of Manteuffel in his operations against the Army of the East under Bourbaki and compelled the French to retreat into Switzerland In recognition of his services he received 450,000 marks from the government, the order of the Black Eagle, etc, and was appointed Governor of Berlin in 1879 He resigned in 1882 His memoirs were edited by Von Bremen (Bielefeld, 1901)

FRANTZ, frants, KONSTANTIN (1817–91) A German publicist He was born near Halberstadt, was educated at Halle and Berlin, for a time studied and wrote on mathematics and philosophy, and after acting as private secretary in the Berlin Foreign Office was attached to the consular service in Spain for three years (1853–56) The central idea expressed in his works is the ultimate and inevitable confederation of central Europe against the United States and Russia, with the Teutonic peoples as a nucleus His principal works are *Der Foderalismus als das leitende Princip für die soziale, staatliche und internationale Organisation* (1879), *Die Weltpolitik* (1882–83), and a part of Schuchardt's *Die deutsche Politik der Zukunft* (1899) Consult Schuchardt, *Frantz, Deutschlands wahrer Realpolitiker* (Melsungen, 1896)

FRANTZIUS, fran'tsī-us, ALEXANDER VON (1821–77) A German explorer, born at Danzig He was educated at Heidelberg and Berlin and became established as a physician at Alajuela and in 1853 at San José, Costa Rica, where he made extensive explorations, the results of which he published upon his return to Germany. His works include *Beitrage zur Kenntnis der Vulkane Costa-Ricas* (1861), *Das rechte Ufer des San Juanflusses* (1862), *Der sudostliche Teil von Costa-Rica* (1869), *San Salvador und Honduras im Jahre 1576* (1873) Several of his works have been translated into Spanish by Cortés, Carazo, and Twight He translated into German (1853) Aristotle's *Parts of Animals*

FRANZ, frants, JULIUS (1824–87) A Ger-

man sculptor He was born in Berlin and was taught by Wichmann and Fischer at the Academy of Art in that city After gaining valuable experience in the studios of Wiedow and Rauch, he produced his first important work, "Shepherd and his Dog in Conflict with a Tiger" (1851, in the Sans-souci Garden near Potsdam) Many works are decorative rather than artistic in character and are distributed about the royal castles at Potsdam Among the colossal groups executed by him in sandstone may be mentioned "America and England" (Berlin Borse), 'Prussia and Hanover," after a design by F A Fischer (Belle-Allianceplatz, Berlin) He received a gold medal at the Berlin Exposition of 1858

FRANZ, ROBERT (1815–92) A celebrated German composer, born at Halle The family name was originally Knauth, but in 1847 it was officially changed In spite of the opposition of his parents, Robert early began to study music, and when 20 years of age went to Dessau, where he was for two years a pupil of Friedrich Schneider Upon his return to Halle he devoted himself to the study of the great masters of music, especially Bach, Handel, and Schubert, but it was not until 1843 that his first collection of songs was published Schumann, Liszt, and Mendelssohn praised them highly, and this success gained for him a position as organist at the Ulrichskirche He later became conductor of the Singakademie and director of music at the university In 1868 Franz was compelled to resign his positions on account of deafness and ill health, and he was only kept from poverty by a series of benefits given by his friends in Germany and America His arrangements of some of Handel's and Bach's works are standard, but it is as a song composer that his fame is assured His 257 songs, which are written for solo voice and piano accompaniment, are similar in style to those of Schumann and of Schubert, and are scarcely excelled by theirs In addition to his songs he composed a number of sacred works, the best of which are his six chorals. He died in Halle His collected writings on the interpretation of works of Bach and Handel were published by R Bethge (Leipzig, 1910) There are a number of biographical sketches of Franz by Ambros, Saran, Schaffer, Schuster, etc, of special note being that by R v Prochaska, *Robert Franz* (Leipzig, 1894)

FRANZ, SHEPHERD IVORY (1874–) An American psychologist He was born in Jersey City, N J, graduated in 1894 from Columbia University (where he was an assistant in psychology in 1897–99), and also studied at the University of Leipzig He taught physiology at Harvard (1899–1901) and at the Dartmouth Medical School (1901–04), and was pathological psychologist at the McLean Hospital, Waverley, Mass (1904–06), and after 1906 professor of physiology and experimental psychology at George Washington University In 1907 he became psychologist and in 1910 scientific director of the Government Hospital for Insane at Washington, D C In 1911 he was president of the Southern Society of Philosophy and Psychology. He contributed largely to scientific journals and published a *Handbook of Mental Examination Methods* (1912).

FRANZ-DREBER, frants′ drā′bĕr. See DREBER, HEINRICH FRANZ.

FRANZEN, AUGUST (1863–). An American portrait and genre painter He was born at Norrkoping, Sweden, and came to the United States in early youth He studied in Paris under Dagnan-Bouveret, and there laid the foundation for the conscientious work as a portraitist which mainly occupied his professional career He established himself in New York, becoming a member of the Society of American Artists in 1894 and associate of the National Academy in 1906 Many distinguished men sat to him and his exhibitions were largely attended A careful regard for the likeness and personality of each sitter characterizes his portraits, which are generally gray in tone and inclining towards the impressionistic treatment He is represented in the Brooklyn Institute Museum by "Yellow Jessamine"

FRANZÉN, fran-tsān′, FRANS MICHAEL (1772–1847) A Swedish author and poet, born at Uleåborg (Finland) While professor at the University of Abo, he published his first volume of poems (1794) After the annexation of Finland to Russia (1809), he lived in Sweden and became successively pastor at Orebro and Bishop of Hernosand (1831) He excelled in lyric poetry, particularly religious songs, some of which are accounted among the best in the Swedish language His works include *Skaldestycken* (5 vols, 1824–36), *Samlade Dikter* (1867–69), and *Valda Dikter* (1871), lyric poems, *Gustav Adolf i Tydskland* (1817–18), an incompleted national epic, *Christopher Columbus* (1831), *Emili eller en afton i Lappland*, *Svante Sture*, and *Lappflickan i Kungstradgården* His *Minnesteckningar* (1848–60), a collection of biographies of prominent Swedes, are models of their kind.

FRANZENSBAD, frants′ens-bat A fashionable watering place in Bohemia, Austria, situated about 1450 feet above sea level, in a somewhat barren, rolling country, 4 miles northwest of Eger (Map Austria-Hungary, C 1) The town is pleasantly laid out with shady streets and charming parks, and is fully equipped as a health resort It is chiefly famous for its chalybeate and saline springs, impregnated with carbonic-acid gas They are 12 in number, and are considered especially efficacious for anæmia and diseases of women. The mud baths (*Moorbader*), formed by mixing warm mineral water with pulverized mineral earth, are employed in cases of rheumatism and skin diseases (Pop, 1900, 2330 The chief industries are bottling water and extracting salts from the water The waters of Franzensbad were mentioned as early as the sixteenth century, and the town was founded by Francis I in 1793

FRANZENSKANAL, frants′ ens-ka-nal, or BÁCSER CANAL A canal of Hungary, since 1801 connecting the Danube and the Theiss. It is 67 miles long, 65 feet wide, and 6½ feet deep

FRANZ JOSEF LAND, frants yō′zĕf. An Arctic archipelago, north of Nova Zembla and east of Spitzbergen, lying north of Asia, mainly between lat 80° and 82° N and long 42° and 65° E (Map Arctic Regions, J 3) It was discovered in 1873 by the Austro-Hungarian expedition under Weyprecht and Payer, and named in honor of their emperor It is a group of about 100 small islands separated by fiords, channels, and sounds The principal islands are Alexander, the most westerly point in long 42° 30′ E, Graham Bell, the most easterly point in 64° 40′ E, Wilczek; Prince George, Prince Rudolph, the most northerly point, Cape Fligely, in 81° 51′ N, and Northbrook, the most

southerly point in 79° 50′ N In general the land is low, though Wullerstoff peak reaches a height of 2408 feet The archipelago is still in the Glacial period, less than one-tenth of the land being ice-free Spitzbergen and the Franz Josef archipelagoes, about 170 miles apart, are doubtless connected by a chain of islands along the eightieth parallel, as Victoria Island is only 50 miles west of Alexander Land and Gillis Land 30 miles east of North East Land, thus leaving an unknown interval of less than 100 miles The islands are volcanic and the geological formation is largely of Jurassic or Tertiary basalt, and in the lower strata fossils of plants and animals have been found As the winter sun is absent more than four months, the climate is distinctly polar The average temperature in the coldest month is about —19° F, and of the warmest month 35° F The cloudiness varies from about 50 per cent in winter to 85 per cent in summer Dense fogs often prevail Violent gales continue for days at a time There are magnificent auroral displays The chief plants of Franz Josef Land are lichens, mosses, and grass The willows, heaths, and sedges usually found at even this high altitude in other countries are here lacking Of flowering plants, the chief are the yellow and white poppy, cresses, *Draba alpina*, scurvy grass, *Cerastium alpinum*, *Saxifraga*, alpine foxtail grass, and *Poa cenesia* The vascular cryptogams are lacking Few species of hepaticæ are present, *Marchantia polymorpha* (the common liverwort of Europe and America) being the most prominent The mosses in numerous places form thick carpets, with a brilliant coloring of green and yellow and bright crimson Sea algæ are rare, but fresh-water algæ are numerous The lichens grow in profusion up to 600 feet above the sea The variety of mammalian fauna is very limited Polar bears are relatively plentiful, a few blue foxes are to be seen walruses are fairly abundant The saddleback and ground seals are scarce, but the ringed seals, or "floe rats," are quite common The avian fauna includes the snow bunting, eider duck, purple sandpiper, various gulls (the glaucus, kittiwake, and ivory), Richardson's skua, Brunnich's and black guillemots, and the little auk, brant goose, snowy owl, and Arctic tern Only half a dozen species of insects have been found

The exploration of the Franz Josef archipelago has been accomplished by the following expeditions Leigh Smith, 1881–82, Jackson-Harmsworth, 1894–97, Nansen in his retreat, 1896, Wellman, 1898 and 1900, the Duke of the Abruzzi, 1899–1900, in which Cagni made the world's record of 86° 33′, Baldwin-Ziegler, 1901–02, and Fiala-Ziegler, 1903–05

Consult Weyprecht, *Sulla spedizione polare austro-ungarica* (Triest, 1875), Payer, *New Lands Within the Arctic Circle* (Eng trans, London, 1876), Greely, *Handbook of Polar Discoveries* (Boston, 1911), Jackson, *A Thousand Days in the Arctic* (New York, 1899), Duke of the Abruzzi, *On the Polar Star in the Arctic Sea* (2 vols, ib., 1903); Peters, *Ziegler Polar Expedition, Scientific Results* (Washington, 1907) See ARCTIC REGION, POLAR RESEARCH

FRANZOS, frän-tsōs′, KARL EMIL (1848–1904) A German journalist and novelist of Jewish descent, noted for his pen pictures of Eastern European life He was born in Podolia, Oct 25, 1848 His first volume, *Aus Halb-Asien* (1876), won European success for its brilliant descriptions of life in Galicia, Rumania, and southern Russia It was translated into several languages This was followed by *Vom Don zur Donau* (1878) and many novels, usually of the same scenes that maintained his reputation Of these the more noteworthy are *Die Juden von Barnow* (1879), *Ein Kampf ums Recht* (1882), the *Michael Kohlhaas* of Galicia, *Tragische Novellen* (1886), *Judith Trachtenberg* (1890), *Der Wahrheitsucher* (1894), *Mann und Weib* (1897)

FRAPAN, fra′pan′, ILSE The pseudonym of the German novelist and poet Ilse Levien (q v)

FRAPOLLI, fra-pōl′lē, LODOVICO (1815–78) An Italian patriot and diplomat, born at Milan He was forced to enter the Austrian army in 1831, but left it as soon as he came of age In 1840 he went to France and studied at the School of Mines He wrote on the origin and formation of the earth, and on the geology of Finisterre and of the Scandinavian countries and Germany (where he traveled in 1843–47), and was made secretary of the French Geological Society He took part in the fighting at Paris in February, 1848, and later in the year went to Milan, and held office in the War Ministry of the Provisional Government in Lombardy Then he was Ambassador in Paris of Lombardy, Tuscany, and the Roman Republic in quick succession, but left the French capital after the capture of Rome, and lived in Switzerland and then in Sardinia, and again in France He was Minister of War under Farini in Modena, but retired, and in 1860 joined Garibaldi's expedition to Sicily and entered Naples with him He was an Italian deputy from 1860 to 1874, an extreme member of the Republican party He was a leader of the Italian Freemasons and became Grand Master in 1869 In 1870 he again fought under Garibaldi in France He died, after a long illness, in a sanitarium

FRAS, or **FRAZ,** JACOB See VRAZ, STANKO

FRASCATI, fras-ka′tē A beautiful summer resort in the Province of Rome, central Italy, on the north slope of the Alban Mountains (q v), 15 miles southeast of Rome (Map Italy, D 4) It is the residence of a cardinal bishop, and has two churches that were mentioned in monastic records as early as the ninth century In the cathedral of San Pietro, dating from 1700, is a memorial tablet to Charles Edward Stuart, the Young Pretender of England, whose body, buried here in 1788, now lies in St Peter's Famous estates at Frascati are the Villa Torlonia (formerly Villa Conti), the Villa Lancelotti (formerly Villa Piccolomini), where in the sixteenth century Cardinal Baronius wrote his *Annales*, or Church history, the Villa Aldobrandini, built by Giacomo della Porta for Cardinal Pietro Aldobrandini, Clement VIII's nephew, which contains paintings by the Cavaliere d'Arpino, and the sixteenth-century Villa Tusculana or Ruffinella, the property once of Lucien Bonaparte and afterward of Victor Emmanuel II This villa was the scene of the robbery of Lucien Bonaparte, which Washington Irving describes in his "Adventure of an Artist." Near by are the ruins of an amphitheatre, the so-called Villa of Cicero, a Roman theatre and reservoir, belonging to the ancient town of Tusculum (q v) Frascati first became important after the destruction of Tusculum in 1191 The city is noted for its wine Pop (commune), 1901, 9915, 1911, 10,577. Consult T Ashby,

Papers of the British School at Rome, vol iv (London, 1907)

FRASCH, frash, HERMAN (1852–1914) An American chemist and inventor, born in Gaildorf, Wurttemberg, Germany He took up the practice of pharmacy in 1868 and, coming to America, entered the laboratory of Professor Maisch at the Philadelphia College of Pharmacy, there he became so interested in industrial chemistry that in 1874 he established a laboratory of his own His earlier inventions facilitated the production of wax, oil, white lead, and salt In 1885, when he went into the petroleum business for himself in London, Ontario, he devoted himself so successfully to the refining and purification of Canadian oils that his product, the highest grade of pure oil, was able to compete with the Pennsylvania oil The patents so successfully developed, as well as the works themselves, were purchased by the Standard Oil Company in 1888 and the processes were put into practice immediately at their various plants in the United States From this time on a further series of patents for the treatment of petroleum and petroleum products were issued to Mr Frasch, but it was in 1890 that he received the patent for what must be considered an epoch-making improvement in the sulphur industry Erecting a plant at the deposits of native sulphur in Louisiana, by the use of superheated water sent down through a boring (at a depth of 1000 feet), he melted the sulphur, which was forced to the surface through an inner tube The melted sulphur, pumped into bins about 50 feet high, would congeal, and the huge blocks later would be broken up by blasting and loaded directly into cars by a derrick of two tons' capacity From these cars the sulphur would be loaded immediately into vessels for shipment to various coast and foreign ports. The result of this invention was that from 1903 the imports of sulphur into the United States diminished from 181,130 tons, valued at $3,549,370, to 19,389 tons in 1914, in which year also there were exported 110,022 tons, valued at $2,018,724 For the economic effect of this invention in the United States and Europe, see SULPHUR In 1912 Frasch was awarded the Perkin medal

FRA'SER, ALEXANDER (1860–) A Canadian author and Gaelic scholar He was born in Inverness-shire, Scotland, and was educated at a classical academy, Perth, and at Glasgow University Coming to Canada in 1886, he engaged in journalism, becoming city editor of the Toronto *Mail* and later of the Toronto *Mail and Empire* He also edited successively the *Scottish-Canadian*, the *Presbyterian Review*, and *Fraser's Scottish Annual* He took a prominent part in founding the regiment of the Forty-eighth Highlanders, Toronto. For some years he was lecturer in Gaelic at Knox College in that city, and in 1895 he delivered the annual Gaelic address before the Gaelic Society at Inverness, Scotland He was elected president of the Gaelic Society of Canada and of the Canadian Folklore Society In 1903 he was appointed archivist of Ontario. He published *Short Scottish-Canadian Biographies, Essays on Celtic Literature, Practical Lessons in Gaelic Grammar; The Mission of the Scot in Canada, The Last Laird of MacNab* (1899), *The 48th Highlanders of Toronto* (1900), *The History of Ontario* (1907), *The Brock Centenary, 1812–1912* (1913).

FRA'SER, ALEXANDER CAMPBELL (1819–1914) A Scottish philosopher He was born in Argyllshire, was educated in Edinburgh University, and from 1846 to 1856 was professor of logic in New College, Edinburgh After contributing extensively to the *North British Review*, he became editor in 1850 and held this position until 1857 In 1856 he succeeded Sir William Hamilton as professor of logic and metaphysics in the University of Edinburgh, retiring in 1891 His work treats the three great problems—the material world, man, and God—in their mutual relations The first is discussed in his *Collected Edition of the Works of Bishop Berkeley, with Annotations and Dissertations* (4 vols, 1871, enlarged ed, 1901) and in a *Biography of Berkeley* (1881), the second in his *Annotated Edition of Locke's Essay on the Human Understanding, with Prolegomena Critical and Historical* (1894), and the three in his collected lectures on the *Philosophy of Theism* (2 vols, 1896, 2d ed, 1899) and his *Biography of Thomas Reid* (1898) He advocates a practical faith in the divine order of a universe incompletely interpretable. He also published *Biographia Philosophica A personal Retrospect* (1904), *Our Final Venture* (1907), *Berkeley and Spiritual Realism* (1908)

FRASER, ALEXANDER MACKENZIE (1756–1809) A British general He was educated at Aberdeen and after a few years in the banking house of Forbes and Company, in Edinburgh, accepted (1778) a commission in the Seventy-third Highlanders. He served in the defense of Gibraltar and as recruiting officer and retired from the army in 1784, when he married Helen Mackenzie In 1793 he was commissioned major in the Seventy-eighth Highlanders He was sent to Guernsey and in the following year to Flanders, covered Abercrombie's retreat before Pichegru and distinguished himself in the sortie from Nimeguen and at Geldermalsen (1795). In 1796 he served at the Cape of Good Hope and a year later went to India, where he campaigned against the Mahrattas When he returned to England, he was elected to Parliament and received the grade of major general (1802) In the next year he inherited property from his aunt and mother and took their family name (Fraser) in addition to Mackenzie After service in England, Hanover, and with Henry Edward Fox (q v.) in Sicily, he was chosen by Fox to command an expedition to get control of Egypt, but fared very badly at Rosetta, after capturing Alexandria, and had to return to Sicily Sent to Portugal (1808), he advanced with Moore into Spain, showed great military ability in the retreat through Galicia and at Corunna, and was made lieutenant general In the following year he sickened while on the Walcheren expedition and died soon after his return to England

FRASER, CHARLES (1782–1860) An American miniature and landscape painter He was born in Charleston, S C, practiced law for 10 years to acquire the means of continuing his art, and eventually was very successful as a miniature painter He painted Lafayette's portrait in 1825 and the miniatures of many prominent citizens of the South and also produced many landscape and genre pictures In 1857 he exhibited in Charleston 313 miniatures and 139 oil paintings He wrote *Reminiscences of Charleston* (1854) and contributed to various periodicals.

FRASER, CHRISTOPHER FINLAY (1839–91) A Canadian statesman He was born in Brockville, Ontario, and was largely self-educated After being employed as a printer in the office of the Brockville *Recorder*, he studied law and was called to the bar of Upper Canada in 1865 He successfully practiced in Brockville, but soon began to take an active interest in politics and after confederation in 1867 was an unsuccessful Liberal candidate for the House of Commons In 1872 he was elected to the Ontario Legislature and, although unseated on petition, was reelected in the same year and remained a member of that body until the close of his public life In 1873–74 he was Provincial Secretary and Registrar in the cabinet of Sir Oliver Mowat (q v) and in 1874 became Commissioner of Public Works, an office which he retained during the rest of his parliamentary career Fraser was a man of sympathetic and attractive personality and an eloquent speaker and strong debater His chief claim to political recognition was his successful leadership of the United Roman Catholic League, an association formed to give the Catholics of the province more efficiency in asserting their rights and in molding legislation

FRASER, DONALD (1826–92). A Scottish Presbyterian minister, born at Inverness He graduated at the University of Edinburgh in 1842 and, after studying theology at Knox College, Toronto, and at New College, Edinburgh, held pastorates in Montreal, Inverness, and at the Marylebone Presbyterian Church, London (1870–92). His works include *Synoptical Lectures on the Books of the Holy Scriptures* (3 vols , 1871–76) , *The Church of God and the Apostasy* (1881) , *Thomas Chalmers* (1881) , *The Speeches of the Holy Apostles* (1882) , *Metaphors in the Gospels* (1885) , *Seven Promises Expounded* (1885) , *Sound Doctrine* (1892) Consult his *Autobiography* (London, 1892), edited with select sermons by Dykes

FRASER, JAMES (1818–85) An English prelate, born at Prestbury, Gloucestershire He was educated at Lincoln College, Oxford, from 1840 to 1860 was fellow of Oriel, where he was tutor in 1842–47 and subdean and librarian in 1844–47, and from 1847 to 1860 was rector of Cholderton, Wiltshire, and in 1860–70 of Upton Nervet, Berkshire In 1858 he received the appointment of assistant commissioner to the Royal Commission on Education and made in 1859 a valuable report on the district assigned to him. In 1865 he visited the United States and Canada as a commissioner on education and in 1866 rendered a second noteworthy report (*Report on the Common School Systems of the United States and of the Provinces of Upper and Lower Canada*). In 1870, having refused the bishopric of Calcutta, he was consecrated Bishop of Manchester. His administration of this diocese, undertaken amid very grave difficulties and carried on with remarkable activity, resulted in the establishment of 109 new district parishes, the consecration of 99 new churches, and the introduction of an admirable system of machinery for diocesan work He won the esteem of all Nonconformists, including the Greek and Jewish congregations at Manchester, and was called "bishop of all denominations" Theologically he was of the old High Church school and opposed to the Tractarian movement In his charities he was liberal He published nothing beyond his reports as parliamentary commissioner and a few addresses and sermons Two volumes of his sermons, edited by J W Diggle, appeared in 1887–88 Consult Hughes, *The Second Bishop of Manchester* (London, 1887) , Diggle, *The Lancashire Life of Bishop Fraser* (3d ed , ib , 1889) , Bryce, *Studies in Contemporary Biography* (New York, 1903)

FRASER, JAMES BAILLIE (1783–1856) A British traveler and author, born at Reelick, Inverness, Scotland He went to the West Indies early in life and later to India, where in 1815 he explored the Himalayas with his brother William In 1821–22 he traveled in Persia, whither he returned in 1834–35 on a diplomatic mission, and in 1835 he entertained on behalf of the British government the two exiled Persian princes His travels and adventures furnished material for romances He wrote *Journal of a Tour through Part of the Himālā Mountains and to the Sources of the Jumna and the Ganges* (1820) , *The Kuzzilbash, a Tale of Khorasan* (1828) , *The Persian Adventurer* (1830) , *An Historical and Descriptive Account of Persia* (1834) , *The Dark Falcon* (1844) , *Military Memoirs of Col James Skinner* (1851).

FRASER, MARY CRAWFORD (MRS HUGH) An English author, the daughter of Thomas Crawford the sculptor, and sister of Marion Crawford the novelist. She was born in Rome, was educated in England and in Rome, married Hugh Fraser, afterward Minister to Japan, traveled with her husband in the two Americas and in the East, and was received into the Roman Catholic church in 1884 Mrs Fraser's finest literary work is found in her interpretations of the new Japan, the land and its people In 1899 she published *A Diplomat's Wife in Japan* (new ed , 1911) and five stories, called *The Customs of the Country, or Tales of New Japan.* She has depicted Devonshire life in *A Chapter of Accidents* (1897) and modern Roman society in *The Splendid Porsenna* (1899) Her work also includes *Letters from Japan* (1904) ; *A Diplomat's Wife in Many Lands* (1910) , *Further Reminiscences of a Diplomat's Wife* (1912) ; *The Honor of the House*, with J I Stahlman (1913) , *Italian Yesterdays* (1913) ; *The Bale Fire*, with her husband (1914).

FRASER, SIMON See LOVAT, twelfth Lord

FRASER, SIMON (c 1729–77) A British soldier, born in Balnain, Inverness-shire He was a subaltern in a battalion of the Earl of Drumlanrig's regiment in the Dutch service, was wounded at Bergen-op-Zoom in 1748, and in 1749 was pensioned upon the reduction of the two battalions to one In 1757 he was appointed a captain lieutenant in the Second Highland Battalion (later the Seventy-eighth Highlanders) and was promoted to the rank of captain in 1759 He was at the siege of Louisburg and in the action at Quebec. He afterward served in Germany, at Gibraltar, and in Ireland, and in 1768 became lieutenant colonel of the Twenty-fourth Foot With the rank of brigadier for America, he accompanied Burgoyne in the pursuit of the American forces retreating from Fort Ticonderoga under the command of St Clair, and at Hubbardton (July 7, 1777) he won a complete victory over them He fought in the first battle of Saratoga (September 19), and was mortally wounded in the second (October 7)

FRASER, SIR THOMAS RICHARD (1841–1920). An English physician, born at Calcutta

and educated at the University of Edinburgh, where he graduated in medicine in 1862 He was assistant physician in the Royal Infirmary, Edinburgh (1869–74), a member of the Admiralty committee on Sir George Nares's Arctic expedition in 1876–77, and in 1877 became professor of materia medica at Edinburgh and of clinical medicine in the year following He was dean of the faculty of medicine from 1880 to 1900, president of the Indian Plague Commission (1898–1901), president of the Royal College of Physicians of Edinburgh (1900–02), of the Medicochirurgical Society (1901–03), and of the Association of Physicians of Great Britain and Ireland (1908–09). In 1902 he was knighted Known as an authority on poisons, he published *An Investigation into Some Previously Undescribed Tetanic Symptoms Produced in Cold-blooded Animals* (1867–68), *An Experimental Research on the Antagonism between the Action of Physostigma and Atropia* (1870), *The Character, Action, and Therapeutic Uses of Physostigma* (1883), which won the Barbier prize from the Academy of Sciences, Paris, and the *Dyspnœa of Bronchitis and Asthma* (1887)

FRASER, Sir William (1816–98) A Scottish genealogist, born in Kincardineshire He became deputy keeper of the records at Edinburgh in 1880 The valuable material there enabled him to prepare his numerous genealogical works, which though dry in style are of great importance to the student of Scottish history From 1869 to 1898 he drew up reports on Scottish historical manuscripts for the Royal Commission on Historical Manuscripts He gave £25,000 to found a professorship of paleography and ancient history at Edinburgh and an equal sum for homes for the poor of the city. Among his works are *History of the Carnegies, Earls of Southesk* (2 vols, 1867), *The Chiefs of Colquhoun and their Country* (2 vols, 1869), *The Lennox* (2 vols, 1874), *The Douglass Book* (4 vols, 1885), *The Elphinstone Family Book* (2 vols, 1897)

FRASER, William Alexander (1859–). A Canadian poet and novelist Born and educated in Pictou Co, Nova Scotia, he early went to New York, then to Boston, and afterward to India (where he lived seven years at one time and a year and a half at another). Five years he spent in the Canadian Northwest. The life of these regions is vividly described in his writings, which include, besides a large number of short stories which appeared in the best American and British periodicals *The Eye of a God, and Other Tales of East and West* (1899); *Mooswa and Others of the Boundaries* (1900); *The Outcasts* (1901), *Sorrow and Old Friends* (1901), *Thoroughbreds* (1902), *The Blood Lilies* (1903), *Brave Hearts* (1904), *The Sa'-zada Tales* (1905), *Thirteen Men* (1906), *The Lone Furrow* (1907). Among his poems are the words of a national song entitled "Canada, God, and our Land"

FRASER, Sir William Augustus (1826–98) An English politician and author, educated at Eton and at Christ Church, Oxford. Entering the army, he rose to a captaincy in 1852, but resigned his commission and entered Parliament in the Conservative interest He represented Barnstable (1852 and 1857), Ludlow (1863), and Kidderminster (1874–80) Fraser became famous in London society for his stories and anecdotes concerning Wellington and Disraeli He published *Words on Wellington* (1889), *The Waterloo Ball* (1897), *Disraeli and his Day* (1891), *Hic et Ubique* (1893), *Napoleon III* (1896) His library was sold at auction for over £20,000

FRA'SERA A genus of North American plants of the family Gentianaceæ, comprising about 10 species, and named after John Fraser, an English botanist The species are strong-growing, single-stemmed, usually biennial herbs with thick bitter roots, opposite or whorled leaves, and bluish, white, or yellowish, generally spotted flowers in cymose clusters They are rarely seen in cultivation

FRA'SERBURGH A seaport in Aberdeenshire, Scotland, 42 miles north of Aberdeen (Map Scotland, G 2) It is the chief seat of the Scottish herring fishery and, besides cured herrings and cod, exports oats, barley, meal, and potatoes It has three tidal harbors, and its shipping includes 14 sailing vessels, 8 steam vessels, and a fleet of 700 fishing boats The herring trade is valued at $1,000,000 yearly The town possesses a handsome cross, town hall, and spacious customhouse, the streets are wide and clean, with substantial dwellings Its site is immediately south of Ptolemy's Promontorium Tœxalium, now Kinnaird Head, on which stands Fraser's ancient castle, utilized as a lighthouse, with its mysterious wine tower and a cave beneath Pop, 1901, 9000, 1911, 11,151, with a large increase during the fishing season in July and August

FRASER RIVER The principal stream of British Columbia, comprising in its basin of 138,000 square miles the greater part of the province (Map British Columbia, D 3, 4). The Fraser River proper has its origin in the union of two branches, the more important of which receives its waters from a series of lakes that lie in lat 54° to 55° N, long about 124° 50′ W, and flows in a general southeast direction for 160 miles, where it unites with the other branch, 200 miles long, which has its source near Mount Brown in the Rocky Mountains The point of confluence is near Fort George, and thence the Fraser River flows in a generally southerly direction through nearly the whole length of the province and, after a total course of about 750 miles, empties into the Gulf of Georgia between Vancouver Island and the mainland, just north of the international boundary of 49° N. latitude Its chief affluents are the Stuart, the Blackwater, the Nechaco, the Bridge, and the Chilcotin on the right, and the Thompson and Quesnel on the left. Between the Stuart and the Chilcotin, and on the same side, the Fraser River is joined by a small affluent of historical interest—the West Road River—which took its name from its having been ascended by Sir Alexander Mackenzie on his adventurous journey of 1793 from the Hudson Bay territories to the Pacific Ocean The Fraser River is navigable for small and powerful steamboats as far as Fort Hope, and at high water to Yale, about 100 miles from its mouth, while as far as New Westminster, about 15 miles from its mouth, it is navigable for ships drawing 20 feet of water. Another stretch of 100 miles in the interior is also navigable for small craft, from Soda Creek to Fort George Cañon Above Fort Hope the river sweeps through Big Cañon, which is traversed from Lytton downward by the Canadian Pacific Railway From April to August the river is sub-

ject to floods, caused by the melting snow on the mountain ranges In the narrow mountain valleys the river rises as much as 60 feet above its normal height and in the lower valleys covers 150,000 to 200,000 acres of rich land

In 1857 the Fraser River, in its auriferous diggings and washings, began to stand forth as the rival of California and Australia The discoveries, originally confined to the lower basins, have become more extensive and more productive, and eastward on the Thompson and northward among the upper waters of the great artery of the country, especially in the Cariboo district south of Fort George, the precious deposit has sometimes given almost fabulous returns After 1862 washings and surface diggings were succeeded by systematic mining and steady labor. The river, its tributaries, and the numerous lakes communicating with them, furnish great facilities for the transport of timber The lower Fraser country especially is densely wooded. The salmon of the river, of which there are five species, are justly famous, and the fishing and canning industries are of considerable importance. The river takes its name from Simon Fraser, who, in spite of the hostility of Indians and the natural difficulties to be overcome, explored it to its mouth in 1808

FRASER RIVER SALMON. A species of salmon (*Oncorhynchus nerka*), called blueback, redfish, etc, which is the most common and valuable one in and near the Fraser River, British Columbia See SALMON, REDFISH, Plate of SALMON

FRA'SERVILLE, or RIVIÈRE DU LOUP, rē'vyâr' du lōō (EN BAS) A town, summer resort, and important railway centre of Temiscouata Co, Quebec, Canada, picturesquely situated on elevated ground at the confluence of the Rivière du Loup with the St. Lawrence, 118 miles by rail northeast of Quebec (Map Quebec, J 3) It is on the Intercolonial Railway and is the terminus of the Temiscouata Railway It has the Fraser Institute and other educational establishments and carries on a considerable general trade. The manufacturing industries include flour, shingle, and pulp mills, chair, sash and door, furniture, and butter factories, a foundry, machine shops, and a brick plant. The repair shops of the Temiscouata Railway and railway shops of the Intercolonial Railway are located here. The town owns its lighting, water-works, and sewerage plants It is much frequented for its shooting, angling, boating, bathing, and its scenery Pop, principally French-Canadian, 1901, 4569, 1911, 6774

FRASIER, frā'zhēr (OF, Fr, strawberry plants, from *fraise*, strawberry, from Lat *fragum*, strawberry plant) In heraldry, a strawberry flower appearing in the arms of the Scottish family of Fraser, called by English heralds a cinquefoil and known also as a primrose See HERALDRY

FRATER'NAL INSURANCE The characteristics which distinguish fraternal insurance from other forms are not to be sought in any peculiarity of the insurance itself, but rather in the nature of the body which grants it There is no single feature of fraternal insurance which is not to be found in other systems of life insurance Fraternal insurance is insurance granted by a "fraternal beneficiary" society or order to its members The essentials of such a society, as laid down by the National Fraternal Congress, are, that it should be organized in a system of lodges, that it should have a ritual and a representative form of government, that it should pay benefits, and should not conduct its business for profit Such societies have almost invariably collected their premiums by means of assessments, but the assessment principle is not essential to their business, and on the other hand its use is by no means confined to such organizations A great deal of undeserved odium has attached to fraternal insurance societies owing to the failure to discriminate between them and commercial assessment companies The history of the latter is for the most part a record of inefficiency or dishonesty on the part of the managers and credulity on the part of the members, ending in a large proportion of cases in financial disaster

History The early American fraternal societies were established somewhat on the lines of the English friendly societies, several of which founded branches in the United States during the first half of the nineteenth century Both the English and the early American societies paid benefits of various kinds, often including funeral benefits and payments to the survivors of the deceased members, but none of them established a system of payments deserving the name of life insurance The first person in the United States to recognize the possibilities of developing on a large scale cooperative relief in the form of death benefits or life insurance through a system of affiliated lodges was John Gordon Upchurch, who founded in 1868 the Ancient Order of United Workmen Several other benefit societies, organized on the lodge system, were established during the next decade Some of these introduced the insurance feature at once, led to it by the high rates charged by the old-line companies and the harsh provisions of their policies A more powerful impetus towards the introduction of insurance into such societies came in the seventies, when more than 60 legal-reserve old-line companies failed, creating a feeling of distrust and hostility towards them Under the influence of this feeling fraternal societies already established introduced the insurance feature, new societies providing for it were formed, and nonfraternal assessment insurance companies appeared in large numbers In the decade 1881–90 many additional fraternal insurance companies were organized The eleventh census reported that on Dec 31, 1889, there were in the United States 298 such orders, with 40,342 subordinate lodges Owing to unsound financial method, many of these were short-lived, so that, in spite of the founding of many new orders, since 1890 there has probably been no increase

It is impossible to compile a complete list of fraternal insurance societies, since in many States they are exempted from the duty of making reports to the Insurance Department The reports for the year ending Dec 31, 1913, of 75 fraternal insurance societies doing business in the State of New York show a total of insurance certificates of 5,032,284, with protection in force at the end of the year aggregating $6,163,020,552 Of the societies reporting, the one having the largest membership was the Modern Woodmen of America, which had 962,966 certificates, representing $1,545,759,000 protection, in force The aggregate sum paid by members was $80,461,386, and the total disbursements for losses were $64,091,344 The expenses were $10,386,102 The 34 joint-stock and mutual life-

insurance companies in the State reported to the same department Dec 31, 1913, an aggregate of 7,001,913 policies, with $13,527,321,222 protection in force Losses and claims were $246,459,831, while premium receipts aggregated $597,202,210

Organization and Activities The forms of organization of the fraternal orders are various Their government is representative and is vested in a supreme body consisting of an executive head and certain official associates In some orders State lines are observed and State officers exercise immediate jurisdiction in many matters over the local lodges in the State While nominally subordinate to the general body, they are more or less masters of the order in their own territory Some orders have no intermediate State organization, the local associations are directly affiliated with the supreme body. The Ancient Order of United Workmen may be cited as an illustration of the former class, the Independent Order Sons of Benjamin of the latter The activities of the different orders are also very various It is unnecessary to speak of the social features which constitute so important a part of their life These are entirely under the control of the local bodies and manifest little approach to uniformity In the matter of benefits also there is very great diversity Some of the societies give only death benefits, others give benefits of many other kinds, such as disability, accident, sickness, burial, and monument benefits These miscellaneous benefits are usually supported and managed by the local lodges The death benefits, on the other hand, are usually under the control of the supreme national body, in a few orders they are maintained by the general State organization Three federations of fraternal beneficiary associations have been formed—the National Fraternal Congress, the American Fraternal Congress, and the Associated Fraternities of America The National Fraternal Congress was formed at a meeting held in Washington in 1886, at which delegates from 17 orders were present In the constitution the objects of the congress are "declared to be the uniting permanently of all legitimate fraternal benefit societies for the purposes of mutual information, benefit, and protection" In recent years it has devoted a large part of its time and energy to the attempt to accomplish two objects The first is the voluntary increase of assessment rates by the affiliated orders for the purpose of accumulating reserves, or, as they prefer to call them, emergency funds, the second is the securing of uniform legislation by the various States on matters affecting fraternal insurance Some of the specific measures advocated by them will be referred to later on

The American Fraternal Congress was organized at Omaha, Neb, in 1898, by representatives of 18 fraternal orders The purpose of this organization was to work for the establishment of reserve funds by the fraternal societies No society without a reserve fund was eligible to membership The National Fraternal Congress has done so much work along the same line that the more recent federation had little occasion to act and has not become very prominent The Associated Fraternities of America was organized at Chicago in 1901 by representatives of the younger fraternal orders Forty-two societies were represented at the meeting The first annual meeting was held in July, 1901, 24 associations being represented In its early years the Associated Fraternities of America was vigorously opposed to the policy of the National Fraternal Congress of seeking legislation fixing a minimum assessment rate The two organizations soon sank their differences, however, and cooperated in many cases in legislative programmes In 1913 they formed an amalgamation under the name of the National Fraternal Congress of America.

Technique Assessment insurance was organized largely in protest against the methods of the old-line life-insurance companies It was generally believed that the cost of insurance in those companies was unnecessarily high A reduction in cost was anticipated from two sources In the first place it was proposed to reduce the expense of management to a minimum and in this way to cut down the "loading" which the old-line companies added to the natural premium In the second place it was proposed to do away with the enormous surpluses which the old-line companies were popularly supposed to be continually accumulating and never paying out. "Pay your losses as they occur and keep your reserve in your own pockets," was the maxim of the advocates of the assessment principle No financial craze recorded in history has affected more people, or people with sounder judgment in ordinary business matters, than did the assessment craze Its culmination was reached in the establishment of a large number of assessment endowment societies, which guaranteed to every member a certain stipulated sum at the end of a fixed period of time in return for a number of periodical payments to the company The Iron Hall was the first and most notorious of these associations This organization virtually promised its members that in consideration of the annual payment to the society for seven years of 18 assessments of $2 50 each, making a total contribution of $315, each member should receive from the society $1000 at the end of the seven years. For a few years such payments were actually made, the endowments of the early members coming out of the contributions of the new members Only by a steady increase of membership at a continually increasing geometrical ratio could such a system be maintained The Iron Hall and all its imitators came to grief within a few years, bringing loss upon millions of people in the United States

The assessment life-insurance companies were managed on no sounder principles than the assessment endowment societies At the beginning all of them, whether fraternal or nonfraternal, raised their funds by assessments after the death for which indemnity was to be paid In the early days of an assessment company, while the average age of the members was low and the benefit of medical selection was still felt, these assessments were very small Knowledge of the scientific principles of life insurance was not to be found among the promoters of these companies The need of mortality tables and the desirability of accumulating a surplus during the earlier years to prepare for increasing mortality were both denied It was the general claim that the continual accession of new members would prevent any advance in the average age of the members or in the death rate This might have been the case if a company had been started with a membership whose age distribution was properly related to a sound

mortality table It could not possibly be the case in a company which started, as all these companies did start, with a great preponderance of young members In such a company it is clear on a priori grounds that the average age of members must increase Experience soon demonstrated the same fact The average age of members and the death rate increased, and the inevitable increase in the rate of assessment kept new members out of the society, and, on the other hand, the lapse rate continually advanced, through the withdrawal of members who were unwilling to pay the increased assessments, or desired to join new societies in which the average age, death rate, and assessments were still low The vast majority of nonfraternal assessment societies and a large number of fraternal associations were in this way forced out of business

The greatest enemies of an old-established fraternal insurance society are unreasonable expectation created by unjustifiably low rates at the beginning, and new companies with low mortality and small assessments Realizing this fact, the old societies adopted two lines of action to protect themselves In the first place they undertook a campaign of education among their own members Year after year they analyzed the returns of the constituent orders and pointed out the inevitable advance from year to year in average age, in death rate, and in cost of insurance, as well as the tendency of the members to desert the old companies and flock to the new. A comparison of the average annual death rate in different years for the entire congress has no significance, since old companies with a high death rate are continually passing away and new companies with low death rates coming in At the meeting of the congress in 1899 the report of the committee on statistics pointed out that while the average death rate for the whole body was 8 65 per 1000 in 1898, as compared with 9 32 in 1897, if allowance was made for the influence of the new orders in lowering the rate (it was impossible to make allowance for the similar effect of the withdrawal of the older orders), the figures would be 8 87 in 1897 and 8 89 in 1898 The committee also compiled the death rates for 21 companies for each of 10 years In 1888 the average had been 7 22, in 1893, 9 34, and in 1898, 10 84 As to the effect of these changes upon membership it was shown that of the 46 orders reporting that year 19 had a death rate above the average for the group, and 27 a rate below the average, that the 19, with a membership at the beginning of the year of 869,862, had made a net gain during the year of only 2415, and that the 27, with a membership at the beginning of the year of 1,192,811, showed a net gain of 217,282 The rate of gain in the former group was 0 28 per cent and in the latter 18 26 per cent

In a similar way the committee demonstrated that average age and cost of insurance both increase as the society grows older Thoroughly aroused by such revelations, the congress authorized the appointment of a committee to prepare tables of rates by applying to a proper extent the principles of a reserve or an emergency fund This committee first prepared a new mortality table, after investigation which convinced it that the tables of mortality in use by the old-line companies were higher than experience justified The divergence between the old tables and the new ones is brought out by the following comparison of the death rate per 1000 living at different ages

AGE	American experience table	Fraternal table	AGE	American experience table	Fraternal table
20	7 81	5 00	60	26 69	22 75
25	8 07	5 20	65	40 13	34 40
30	8 43	5 55	70	61 99	53 65
35	8 95	6 15	75	94 37	85 48
40	9 79	7 17	80	144 47	138 10
45	11 16	8 88	85	235 55	225 10
50	13 78	11 45	90	454 55	368 95
55	18 57	15 71	95	1000 00	606 78

While the mortality experience of every old-line life-insurance company which exercises due care in the selection of its risks shows a rate of loss below that indicated by the American experience table, the degree of difference between the two tables here outlined gives reason to think that the fraternity table is very close to the margin of safety According to the report of the National Fraternal Congress for 1913, the number of deaths during the year was 96 27 per cent of the expected deaths Dividing risks into two classes, those under 50 and those over, it appears that the ratio of actual deaths expected was 83 35 per cent for the former and 112 74 for the latter. These figures are substantially repeated year after year

On the basis of the new mortality table, and on the assumption that the reserve will earn 4 per cent interest, the committee prepared several tables of minimum rates. Besides the level annual rate, such as is commonly used by old-line companies for whole-life policies, the committee prepared a table of rates peculiar to the fraternal and assessment societies, the so-called step rate. The step rate advances with advancing age, but not from year to year as the natural premium rate does, but at stated intervals, usually every five years By a modification of the step-rate plan a slight addition is made to the premium rate during the earlier years, in order to make possible a reduction of the rate in old age All the rates prepared by the committee presupposed the abandonment of the system of assessing after the occurrence of the loss and the accumulation of a surplus at least for one year The congress urged its members to adopt as minimum rates those prepared by the committee, with such loading for expenses as each association found necessary Some organizations did this, but the extent to which changes were introduced was very unequal. The result was a high degree of diversity of rates At the National Congress for 1899 there was exhibited a table of rates actually charged for the same kind of insurance at the same age in different fraternal societies At age 50, e g, no less than 41 rates for the same protection were in force in different companies, varying by moderate differences from a minimum of 65 cents to a maximum of $3 80

Despairing of its ability to secure the adoption of the new rates through the voluntary action of the orders, and dreading the effect of the competition of new orders with low rates, the congress undertook to secure the adoption of these rates through legislation In the session held in 1901 the president reported that legislation requiring the establishment of these minimum rates as conditions of doing business in

the State had been secured in five States, viz, North Dakota, Tennessee, Washington, Vermont, and Indiana At the Congress of Insurance Commissioners at Colorado Springs in 1909, at the instance of the president of the National Fraternal Congress, a bill was prepared the provisions of which were calculated to insure the solvency of the orders This bill was indorsed, in modified form, at the Mobile Congress in 1910, and hence is known as the Mobile Bill The bill requires the orders to make reports of condition, in which reports certificates shall be valued on the basis of the National Fraternal Congress table, as minimum, and returns from investments shall be calculated at not above 4 per cent The Mobile Bill had been enacted in 1913 in 11 States and had been put into operation by insurance-department ruling in two States An amended form of this bill, known as the New York Conference Bill, had been adopted in 14 States Six other States have enacted laws having substantially similar provisions In the 33 States covered by such laws no society can be organized except on the basis of fairly adequate rates

Rates in the fraternal companies can be legitimately kept below rates in the regular companies in only two ways—either by making such a selection of lives that the rate of mortality is lower in the former than in the latter, or by keeping expenses of management below those of the old-line companies To a greater or less extent both these aims are accomplished There can be no doubt that the close personal scrutiny which every individual undergoes before being admitted to a lodge is a valuable supplement to the medical examination If it is found that the mortality schedule adopted is sufficiently high, rates may legitimately be put below the old-line level Moreover, the expense of management in the fraternals is reduced to a minimum It is clear, therefore, that there are great opportunities for economy by the fraternal companies, and it may fairly be expected that those among them which take to heart the lessons of experience and put their business on a sound basis, so far as the matter of surplus is concerned, will continue their usefulness indefinitely, furnishing insurance in comparatively small amounts at low rates to those most in need of it and least able to pay for it at high rates Consult F H Bacon, *Treatise on the Law of Benefit Societies and Life Insurance* (3d ed, 2 vols, St Louis, 1904). See FRIENDLY SOCIETY.

FRATERNITIES (Lat. *fraternitas*, brotherhood, from *fraternus*, brotherly, from *frater*, brother, connected with Gk *φράτηρ*, *phratēr*, clansman, OChurch Slav *bratrŭ*, OPruss *bratis*, Lith. *brōlis*, Ir, Gael *brathair*, Corn. *bredar*, Skt *bhrātar*, Goth *brōþar*, OHG. *bruodar*, Ger *Bruder*, AS. *brōþor*, Eng *brother*), AMERICAN COLLEGE Societies of students found in nearly all the colleges and universities of the United States In general they are secret in character, but this secrecy is largely nominal, consisting chiefly of extreme care in protecting their constitutions, mottoes, and grips from outside knowledge and in holding secret meetings. Aside from this they do not cultivate mystery in their methods of work The fraternities are composed of branches called "chapters," situated in the various colleges. But no fraternity has more than one chapter in any one college Usually the students of all collegiate departments are eligible to membership, though the academic department has uniformly furnished the largest part of fraternity membership Fraternities are variously termed by outsiders "Greek-Letter Fraternities" and "College Secret Societies," but among themselves the term "Fraternities" is universally used

Nomenclature The Greek alphabet is generally employed to name both the fraternity and the chapter Usually a Greek letter is assigned to a chapter according to the order of its establishment, but in some fraternities the name of the State may be added, and less frequently the chapter takes its name from the college or town in which it is placed In one professional fraternity the chapters are named after some prominent individual When chapters have used all the letters of the alphabet, it is customary to start anew, and add the word "deuteron" to the letter, thus signifying second The badges of the fraternities are of three types One is a plate of gold, which displays the fraternity name and one or more symbols of special significance A second form is a monogram of the letters of the fraternity, while the third is a symbol, as a key, a skull, or a scroll

Origin, etc The first Greek-letter society, Phi Beta Kappa, was organized at the College of William and Mary in 1776 "The promotion of literature and of friendly intercourse among scholars" was its given object In December, 1779, branches were authorized at Yale and Harvard, and in 1780 the meetings of the parent chapter ended amid the vicissitudes of the Revolution The Yale chapter was established in 1780 and that at Harvard in 1781 In 1787 these two chapters united to found a chapter at Dartmouth College It continued as a secret fraternity until 1831, since when it has become an honorary organization, and membership is gained only by high scholarship and given only to honor men, usually of graduating classes (See PHI BETA KAPPA) Similar in character to the foregoing but selecting its members from among those who have achieved distinction in scientific studies is Sigma Xi, founded at Cornell in 1886 and Tau Beta Pi, organized in Lehigh in June, 1885, which exists in technical and scientific departments only and elects to membership students of high standing in applied science There are many local honorary fraternities, such as Pi Beta Nu at Minnesota, Lambda Sigma Eta at Maine, and Alpha Theta Phi at North Carolina In 1821 a literary society was founded in Yale, called Chi Delta Theta. Other literary societies were organized, in which might be mastered the art of debate, and in which oratory might be indulged in before an audience of college mates These literary societies have served no mean part in college life, and they have had faculty approbation and encouragement, but their literary contests and election rivalries prevented any deep fraternal interest in them The fraternity system, as it now exists, originated at Union in 1825, when Kappa Alpha, the first of men's general fraternities, was established. It imitated Phi Beta Kappa in its secrecy, in its Greek title, and in its limitation of membership to upper-class men The start of the fraternity system was very simple But its novelty was so marked that it at once aroused opposition on the part of the faculty That attitude has now, however, almost entirely changed In 1827 Sigma Phi and Delta Phi were established at Union. In

1831 Sigma Phi placed the first secret fraternity chapter at Hamilton College, and this move probably led to the foundation in 1832 of Alpha Delta Phi at Hamilton, which fraternity then founded its second chapter at Miami University in 1835 Meanwhile, in 1833, Psi Upsilon was established at Union and Delta Upsilon (originally nonsecret) at Williams in 1834 Prior to this expansion the fraternity system was confined to two States, New York and Massachusetts, and to the three colleges, Union, Hamilton, and Williams At Miami in 1839 Beta Theta Pi, the first Western fraternity, was founded Delta Kappa Epsilon was founded at Yale in 1844, Zeta Psi at New York University in 1846, and Delta Psi at Columbia and New York University a year later In 1848 Phi Gamma Delta was founded at Washington and Jefferson, Phi Delta Theta at Miami, and Theta Delta Chi at Union In 1852 Phi Kappa Psi, one of the larger fraternities, was founded at Washington and Jefferson, and in the West Sigma Chi came into existence at Miami in 1855 The oldest of the surviving southern fraternities is Sigma Alpha Epsilon, which was founded at the University of Alabama in 1856, and in 1859 Delta Tau Delta was organized at Bethany During the Civil War there was diminished activity in college life, but with the close of hostilities came renewed interest, especially in the South, where in 1865 Alpha Tau Omega was founded at Virginia Military Institute, and Kappa Alpha (South) at Washington and Lee In 1869 Kappa Sigma was organized at the University of Virginia and Sigma Nu at Virginia Military Institute Among the smaller fraternities are the following Chi Phi, originally organized at Princeton in 1824, Chi Psi, founded at Union in 1841, Phi Kappa Sigma, founded at the University of Pennsylvania in 1850, Theta Chi, organized at Norwich University in 1856, Theta Xi (scientific), founded at Rensselaer Polytechnic Institute in 1864, Pi Kappa Alpha, organized at the University of Virginia in 1868, Phi Sigma Kappa, organized at Massachusetts Agricultural College in 1873, Alpha Chi Rho, founded at Trinity in 1895, Delta Sigma Phi, founded at College of the City of New York, and Sigma Phi Epsilon, organized in Richmond College in 1901 Since that time the system has spread, both by the establishment of chapters in various colleges and by the organization of new fraternities, until in 1914 there were 38 leading fraternities, with a total membership of 2,656,817 distributed among 1228 active chapters, possessing 979 fraternity houses The advent of the fraternity system hurt the prestige of the literary societies through competition for membership and in other ways, and on that account four literary societies met in convention in 1847 and formed the "Anti-Secret Confederation" In 1858 a fraternity was effected out of this confederation, changing its status and adopting the monogram badge of Delta Upsilon In time Delta Upsilon became only nominally nonsecret and now ranks with other secret fraternities

Women's Fraternities The women's fraternities followed naturally upon the opening of colleges to coeducation, and as young women came to participate more and more in college life, to live in dormitories, and take up college residence The first of these sororities was the Kappa Alpha Theta, founded at De Pauw in 1870 The second, Kappa Kappa Gamma, was founded at Monmouth in the same year The Delta Gamma started at the University of Mississippi, and the Alpha Phi was also installed in 1872 at Syracuse The Gamma Phi Beta was launched at Syracuse in 1874 The Delta Delta Delta was organized at Boston University in 1888, and the Pi Beta Phi (originally I C Sorosis) was founded at Monmouth in 1867 Besides the foregoing there are the smaller sororities of Sigma Kappa, founded at Colby in 1874, Alpha Chi Omega, founded at De Pauw in 1885, Beta Sigma Omicron, founded at Missouri State in 1888, Alpha Xi Delta, founded at Lombard in 1893, the Omega, founded at Arkansas in 1895, Alpha Omicron Pi, founded at Barnard, and Kappa Delta at Virginia Normal in 1897, Sigma Sigma Sigma and Zeta Tau Alpha at Virginia Normal in 1898, and Delta Sigma at Brown in 1901 These sororities have a total membership of 48,176 distributed among 395 chapters They are practically identical in aims and purposes with the men's fraternities, and in colleges where houses are owned by sororities their general similarity as part of the college organization is marked

Professional Fraternities There are now fraternities in which membership is restricted to those who are connected with some special profession These include 16 medical fraternities, one of which is honorary, i e, requires high scholarship for admission, 4 legal, also dental, engineering, and pharmaceutical fraternities In all there are about 50 professional fraternities with a membership exceeding 40,000 persons There are also certain undergraduate fraternities in which membership is extended only to those who are following some special subject, as, e g, Phi Lambda Upsilon, which admits only students of chemistry Members of professional fraternities may also belong to the general college fraternities

Local Fraternities Local fraternities are many and important They now number about 75, with a membership of about 10,000 Those at Yale University are the most widely known They are senior societies and are three in number. Skull and Bones (1832), Scroll and Key (1841), Wolf's Head (1884) They always elect 15 men in each year, have no electioneering or pledging, but until recently offered their elections on the campus on a certain date of each year (called "tap day") in an impressive manner in the presence of the student body

Organization, etc Prior to 1861 the government of a fraternity was usually retained as a heritage by one chapter, but was modified at times by the several chapters assembled in convention The year 1870 is generally accepted as the date of a solidified system In general, the legislative power of fraternities has been vested in an annual convention of delegates, while the administration has been placed upon a few officers there elected

Social life forms the basic raison d'être of all fraternities They seek as members those who promise to contribute most to a fellowship where social equality, good scholarship, athletic abilities, and mutual helpfulness are assured

Naturally the contest for members is intense In general this campaign is the great student feature of the beginning of each college year The chapter house is the most notable part of fraternity life Statistics show that there were in 1883 but 33 houses owned and occupied by the general fraternities. In 1914, 1128 houses were owned or occupied by the national, local,

and women's fraternities of the United States Of these 979 were owned by the men's fraternities, and 149 owned by the sororities This great increase is instructive, illustrating the growth of fraternities in recent years

Fraternity members are styled "active" when in actual college attendance, "alumni" afterward Should they be elected while not undergraduates, they are termed honorary members To bestow honorary membership is, however, at the present time generally discountenanced Most fraternities publish catalogues, song books, and magazines The catalogues generally contain addresses of members, the rolls of chapters, and tables of varied statistics, including a table showing the geographical distribution of chapters and members Histories have been issued by some of the fraternities The song books have special music in addition to usual college songs, with words written by members The periodicals are an important factor in the fraternity life and are published by many of the fraternities, including sororities

The legal status of fraternities has in several cases been in litigation In one case, hinging upon the right of a college faculty to debar a student because of his fraternity membership, the Supreme Court of Indiana (1881) decided "There is no doubt whatever that if an applicant for admission into a public college is otherwise qualified, and there is room to receive him, he cannot be denied admission by reason of membership in a college fraternity" And the court held further that the requiring by the faculty of a written pledge from the student that he would not join a fraternity, as a condition precedent to his matriculation, implied discrimination against a class of inhabitants of the State On the other hand, it appears to be established that a privately endowed and managed college may exact and enforce such a pledge One of the most important cases that has been recently decided, at least from a theoretical point of view, and involving the internal organization and powers of a fraternity, was that of the Kappa Kappa Gamma Society *versus* certain members of its Grand Council The Grand Council had endeavored to withdraw, without its consent, its Beta Beta chapter, and suits to restrain the Council, through the individual members thereof, were instituted in New York and Massachusetts The Massachusetts court dismissed the suit on the ground that no property right was involved, but the New York courts held, on appeal, among other things, that the *publication of fraternity suits* by the Beta Beta chapter had been proper, inasmuch as the fraternity had virtually compelled it, that rights were affected for which a court of equity could give remedy, and that the fraternity should, on the facts presented, be restrained from withdrawing its chapter Consult Baird, *American College Fraternities* (New York, 1912), Kellogg, *College Secret Societies* (Chicago, 1874), Aiken, *The Secret Society System* (New Haven, 1882), Heckethorn, *Secret Societies of all Ages and Countries* (new ed, London, 1897), Maxwell, *Greek Letter Men of New York* (New York, 1899), Stevens, *Cyclopædia of Fraternities* (2d ed, ib, 1907) For Plate of fraternity badge, see SOCIETIES, see also COLLEGES, AMERICAN

FRATICELLIANS, frăt'ĭ-sĕl'ĭ-anz *or* fra'tē-chĕl'lē-anz, or **FRATICELLI,** -sĕl'ĭ *or* -chĕl'lē (It., ML *fraticelli*, little brethren, dim of Lat *frater*, brother) A name applied to various more or less strictly defined heretical sects of the fourteenth and fifteenth centuries, mostly in Italy, not closely connected either by their beliefs and tendencies or by their time Their general tendency was one of protest against the existing ecclesiastical and social order, and there is little to distinguish them, to the modern mind, from the Albigenses, Waldenses, Catharini, Beghards, and Brethren of the Free Spirit The name is found as early as the beginning of the fourteenth century, e g, in the chronicle of Giovanni Villani The origin of the Fraticelli proper has often been connected with a particularly strict and rigorist party within the Franciscan Order This theory is supported by the fact that this name was common in Italy to designate the Friars Minor, but it seems much more likely that, as the immense popularity of the Franciscan Order produced a multitude of unauthorized imitations of it, these innovations in doctrine found ready acceptance in such groups, unrestrained as they were by any close oversight of ecclesiastical authority One group which bore this name may be traced to Gherardo Segarelli, a laboring man of Parma, and his disciple, Dolcino of Novara, who organized their followers as an "apostolic order," and made considerable noise in Upper Italy from 1260 to 1307 They declared poverty an absolutely essential condition of belonging to the true Church, and regarded the existing Church as in a state of apostasy They had no fixed domiciles, but wandered from place to place They were not bound by any definite rule, and were charged with "free-love" excesses The adherents of Segarelli and Dolcino held that all authority was forfeited by sin and proceeded to fill all the offices which, on their hypothesis, were vacant, electing a certain Majoretti Emperor, a secular priest named Rainaldo Pope, and choosing archbishops of Florence and Venice and a general of the Franciscans who did not even belong to the order They were gradually suppressed in the course of the first half of the fifteenth century, John Capistrano was commissioned as inquisitor general in their regard by Martin V, Eugenius IV, and Nicholas V, and succeeded in completing their eradication Their last pseudo-pope was burned at Fabriano in 1449, and the sect disappears from history with him For the sake of clearness, it would be well to restrict the name 'Fraticelli" to the sect above described, but it is sometimes given to the rigorist Franciscans, who tried to keep the order strictly to the original rule of poverty, and to the followers of Michael of Cesena, who taught that Christ and His disciples possessed no property Consult Dollinger, *Beitrage zur Sektengeschichte des Mittelalters* (Munich, 1890), and Lea, *History of the Inquisition* (New York, 1907), and see FRANCISCANS

FRATRES ARVALES. See ARVAL BROTHERS

FRATRES CALENDARII. See CALAND

FRATTAMAGGIORE, frat'ta-ma-jō'rā A city in the Province of Naples, south Italy, 8 miles north of Naples, with a fine parish church, silk and rope factories, and numerous country houses of rich Neapolitans Pop (commune), 1901, 13,170, 1911, 13,720

FRAUD In its broadest sense, any variety of falsehood or artifice by which one deceives another to his legal injury Courts have been

of the Canton of Thurgau, Switzerland, situated in a beautiful and fertile district on the Murg, 25 miles northeast of Zurich (Map Switzerland, C 1) It is regularly built and has among its buildings a Catholic church dating from 1286 and an old castle, the government building, containing the cantonal archives and library, the town hall, and the military barracks There is a technical school with scientific and historical collections The town manufactures gloves, cotton and iron goods, guns, machinery and leather, and is also a centre of trade for wine, fruit, and agricultural products From 1712 to 1798 the town was the capital of the Swiss Confederation Pop (commune), 1900, 7861, 1910, 8105, mainly Protestants

FRAUENLOB, frou'en-lōp (Ger, ladies' praise) (c 1250–1318) The assumed name of Heinrich von Meissen, one of the German minnesingers (q v) After years of wandering as a minstrel, he is said to have established the first school of early mastersingers (see MEISTERSINGER) in Mainz In token of appreciation for his chivalrous devotion to "ladyhood," ladies of Mainz are said to have borne his body to the grave in the cathedral During the Werther period of German literature ladies restored his tombstone in 1783, and near it other ladies, in 1842, erected a beautiful monument Frauenlob's bombastic and artificial poems, striving to appear erudite, have been edited by Ettmuller (1843), and his *Cantica Canticorum* has been translated into English

FRAUENSTADT, frou'en-stĕt, CHRISTIAN MARTIN JULIUS (1813–79). A German philosopher, born at Bojanowo, Province of Posen, Prussia He studied theology and philosophy at Berlin, and became one of the most ardent disciples of Arthur Schopenhauer Many of his works reflect the influence of that thinker, whose ideas Frauenstadt extends, but frequently also modifies Some of his more important works are *Die Naturwissenschaft in ihrem Einfluss auf Poesie, Religion, Moral und Philosophie* (1855), *Neue Briefe über die schopenhauersche Philosophie* (1876), *A Schopenhauer Lichtstrahlen aus seinen Werken* (7th ed, 1891) He also edited the first complete edition of Schopenhauer's collected works (1873–74)

FRAUNCES'S (frąn'sĕz) **TAVERN.** One of the oldest buildings of New York City, at the southeast corner of Broad and Pearl streets, originally a mansion of the Delanceys and subsequently transformed into a tavern. Washington made it his headquarters after the British evacuation of New York and in it took farewell of his officers on Dec 4, 1783 The New York Chamber of Commerce was organized in it in 1768 In 1902 it was purchased and restored by the Sons of the Revolution

FRAUNHOFER, froun'hō-fĕr, JOSEPH VON (1787–1826). A distinguished Bavarian optician and physicist, born at Straubing In 1799 he was apprenticed to a glass cutter in Munich, and in 1806 was received, as a working optician, into the establishment of Reichenbach & Utzschneider at Benedictbeuern, of which he later became the head, and which afterward, in 1819, was removed to Munich While there he acquired considerable wealth and reputation through his inventions, and soon afterward became proprietor of the establishment He was especially successful in producing large pieces of optical glass free from imperfections, which could be used for prisms and lenses, and as he combined the mechanical skill and technique of the optician with the theoretical knowledge and mathematical training of the physicist, his instruments were always in demand He invented a machine for polishing parabolic surfaces, and was the first one who succeeded in polishing lenses and mirrors without altering their curvature Prisms made under his direction were celebrated for being free from inequalities and striæ His inventions are numerous and include a heliometer, a micrometer, an achromatic microscope, besides the great refracting telescope at Dorpat But that which has rendered Fraunhofer's name celebrated throughout the scientific world is his discovery of the dark lines in the spectrum, which are now known by his name (See SPECTROSCOPY) He was the first to obtain a spectrum from a grating (see DIFFRACTION AND DIFFRACTION GRATINGS), and with this apparatus was able to measure the wave length of sodium light Fraunhofer was a diligent student and investigator as well as a successful instrument maker, and was elected a member of the Munich Academy of Sciences (1817), and five years later became conservator of its physical cabinet

FRAUNHOFER LINES See SPECTROSCOPY

FRAX'INEL'LA See DITTANY.

FRAX'INUS See ASH

FRAY BENTOS See INDEPENDENCIA

FRAY GERUNDIO, fra'ē hā-rōōn'dē-ō See LAFUENTE, MODESTO

FRAY GERUNDIO DE CAMPAZAS, dā kam-pa'thas. A romance by Isla (1758), satirizing the degraded type of pulpit oratory of the period in Spain

FRAYSSINOUS, frā'sē-nōōs', DENIS ANTOINE LUC, COUNT DE (1765–1841) A French prelate, born at Curières, Aveyron He became known at Paris for his conferences at the church of St Sulpice (in 1803–09, thereafter prohibited by Napoleon), and in 1816 he was appointed court preacher and first almoner to Louis XVIII. In 1824–28 he was Minister of Public Worship, and during these years the Jesuits were recalled and Frayssinous became a peer of France He was elected to the Academy in 1822 He was compelled to leave France by the July revolution, and lived in Rome and then at Prague, where he was tutor to the Comte de Chambord In his own day his *Défense du christianisme* (3 vols, 1825) attracted great attention, passing through many editions and versions Consult the biography by Henrion (2 vols, Paris, 1844)

FRAZER, SIR JAMES GEORGE (1854–) A British anthropologist, born in Glasgow He became a fellow of Trinity College, Cambridge, and in 1907 professor of social anthropology at the University of Liverpool His published works are of the utmost importance for the study of anthropology and (particularly) of religion and myth, which he relates rather closely to magic In his earlier works he followed Mannhardt in tracing to agricultural rites many religious practices and myths, and he held that many gods developed from spirits of vegetation He was knighted in 1914 His books include *Totemism* (1887, supplemented by his article on the same subject in 9th ed of *Encyclopædia Britannica*), *The Golden Bough* (1890, 3d ed, 1913); *Pausanias's Description of Greece* (1898, 2d ed, 1913), *Pausanias and Other Greek Sketches* (1900); *Early History of the Kingship* (1905), *Adonis, Attis, Osiris*

(1906, 2d ed, 1907), *Psyche's Task* (1909, 2d ed, 1913), *Totemism and Exogamy* (1910), *The Magic Art and the Evolution of Kings* (1911), *Taboo and the Perils of the Soul* (1911), *The Dying God* (1911), *Spirits of the Corn and of the Wild* (1912), *The Scapegoat* (1913), *The Belief in Immortality* (vol i, 1913), *Balder the Beautiful* (1913)

FRA'ZER, JOHN FRIES (1812–72) An American scientist, born in Philadelphia, Pa He graduated in 1830 at the University of Pennsylvania, in 1836 was appointed first assistant geologist in the first geological survey of Pennsylvania, and from 1837 to 1844 was instructor in chemistry and natural philosophy at the Philadelphia high school From 1844 until his death he was professor of natural history and philosophy in the University of Pennsylvania He was also vice provost of the university in 1855–68 For some time he was connected with the Franklin Institute as a lecturer He also edited the *Journal* of the Institute and to it contributed several papers, which constitute the most important part of his published writings He was elected to the American Philosophical Society in 1842, and in 1863 became a charter member of the National Academy of Sciences

FRAZER, PERSIFOR (1844–1909) An American geologist, born in Philadelphia, Pa He graduated at the University of Pennsylvania in 1862, was an aid on the United States Coast Survey in 1862–63, served as acting ensign in the Mississippi squadron in 1863–65, and from 1866 to 1869 studied in the School of Mines at Freiberg, Saxony In 1869–70 he was mineralogist and metallurgist on the United States Geological Survey, in 1870–74 was professor of chemistry in the University of Pennsylvania, and from 1874 to 1882 was assistant in connection with the second geological survey of Pennsylvania He received the degree of Docteur-ès-Sciences Naturelles from the Universite de France, being the first person, not a native of France, to whom this degree was ever awarded Among his contributions to science may be cited his explanation of the cause of the white color of the moon as observed by day. He was elected to the American Philosophical Society in 1871 His publications include, in addition to four volumes of reports of the second geological survey of Pennsylvania, *Tables for the Determination of Minerals* (1874) and *Bibliotics, or the Study of Documents* (3 eds, 1894–1901) In 1905 he received from the city of Philadelphia the John Scott medal for contributions to the science of bibliotics

FRAZIER'S or **FRAYSER'S FARM,** BATTLE OF, also called the BATTLE OF GLENDALE, the BATTLE OF CHARLES CITY CROSS ROADS, and the BATTLE OF NELSON'S FARM A battle fought at Glendale, Va, about 12 miles southeast of Richmond, on June 30, 1862, during the Civil War, between a Federal force under General McClellan and a Confederate force under Generals Longstreet and Hill The losses were about 1800 on the Federal and about 2000 on the Confederate side

FREAR, WALTER FRANCIS (1863–). An American public official, born at Grass Valley, Cal He graduated from Oahu College, Honolulu, Hawaiian Islands, in 1881, from Yale University in 1885, and from Yale Law School in 1890 In 1886–88 he taught Greek, mathematics, and economics at Oahu College He was second judge of the first circuit under the Kingdom of Hawaii in 1893, second associate justice of the Supreme Court under the Provisional Government of Hawaii in the same year, first associate justice of the Supreme Court of the Republic of Hawaii in 1896, and Chief Justice from 1900 to 1907, after annexation to the United States He also served on the Hawaiian commission to recommend legislation regarding Hawaii to the United States Congress, and in 1903–05 was chairman of the Hawaiian Code Commission From 1907 to 1913 he was Governor of Hawaiian Territory

FREAR, WILLIAM (1860–1922) An American agricultural chemist He was born at Reading, Pa, graduated in 1881 from the University of Lewisburg (now Bucknell University), where he was an assistant in sciences in 1881–83, and studied also at Illinois Wesleyan University (Ph D, 1883) He was assistant chemist in 1883–85 and special agent after 1900 of the United States Department of Agriculture, professor of agricultural chemistry (1885–1907) and of experimental agricultural chemistry (after 1907) at Pennsylvania State College, and held various important positions in connection with State agricultural work In 1892–94 he was editor and proprietor of *Agricultural Science* He was elected to high office in several scientific and educational associations

FRÉCHETTE, frā'shĕt', LOUIS HONORE (1839–1908) A French-Canadian poet He was born at Point Levi, Province of Quebec, and was educated at the Quebec Seminary and Laval University He was called to the bar in 1864, but was in newspaper work in Chicago during 1866–71 In the latter year he returned to Canada, and in 1874 he represented his native county in the Dominion Parliament, and practiced his profession in Quebec until 1879, when he went again into journalism and successively edited three French papers, respectively in Quebec, Montreal, and Chicago He is the representative poet of French Canada, and his productions brought him honor from many societies, including the French Academy and the Imperial Institute, London He was also made Knight of the Legion of Honor and was elected president of the Royal Society of Canada His poetry is chiefly lyrical and is often inspired by intense patriotic feeling The beauties of nature and the bonds of the family and of friendship were with him far stronger poetic motives than the passion of love He was the first to perfect the form of French-Canadian verse His publications include a remarkable pathetic drama, *Veronica*, and other plays, one sketch in English called *Christmas in French Canada* (1899), a few prose essays in French (*Originaux et détraqués*, 1892, and *La noel au Canada*, 1900), translations of Howell's *Chance Acquaintance*, and Cable's *Creole Days*, but he will be best remembered by his poems *Mes loisirs* (1863), *La voix d'un exilé* (1869), *Pêle-Mêle* (1877), *Les fleurs boréales* (1879), *Les oiseaux de neige* (1879), *La légende d'un peuple* (1887), *Les feuilles volantes* (1891) Consult Roy, "French Canadian Literature," in *Canada and its Provinces*, vol vi (Toronto, 1914) See CANADIAN LITERATURE

FRECKLES, frĕk'k'lz (older form *frecken*, from Icel *freknur*, freckles, ultimately connected with Gk περκνός, *perknos*, spotted), sometimes called *lentigo* and *ephelis* Small yellowish or brownish-yellow irregularly rounded spots, from the size of a pin's head to that of a split pea,

frequently seen on the skin, especially of fair or reddish-haired persons, though they are seen even in mulattoes They occur most commonly during adolescence and are not often met with under the age of six or eight They are seen usually on the face, but often occur on the hands and sometimes elsewhere They are always most distinct in summer, but though the influence of the sun's rays undoubtedly increases their distinctness, it is doubtful whether it can cause them They are due to increased local deposit of pigment granules in the epidermis, persons subject to them do not bronze uniformly under the influence of exposure nearly so deeply as others Many methods of treatment have been advocated for their removal, but in most cases they return upon exposure to the sun Among the milder measures which sometimes succeed in improving the condition is a solution of hyposulphite of soda, 15 to 30 grains, or of chloride of ammonium, 15 grains to the ounce of water A mixture of bichloride of mercury, dilute acetic acid, borax, and rose water is generally efficacious when applied as a wash night and morning

FRED'EGAR, or **FRED'EGA'RIUS SCHOLAS'TICUS** A chronicler of the Franks, who lived in the seventh century He was one of the three compilers of the *Historia Francorum*, a history of the Franks down to the year 642 A D, written in corrupt Latin, but of great value as a source for the history of France during the first half of the seventh century During the eighth century it was continued in the so-called *Gesta Francorum* Fredegar traced the descent of the Franks from the Trojans Consult Krusch, *Fredegarii et Aliorum Chronica* (Hanover, 1888)

FRED'EGUN'DA (c 545–597). A Frankish queen Originally a servant of Audovere, wife of Chilperic of Neustria, she soon won the King's heart and got him to put his wife in a convent and to divorce her But Chilperic married Galsvintha and put away Fredegunda Galsvintha died in the same year (567), probably strangled by Fredegunda, who succeeded her as Queen This brought on war between Chilperic and his brother Sigebert, King of Austrasia, and a bitter rivalry between Fredegunda and Brunhilda, sister of the murdered Queen and wife to Sigebert, who was soon assassinated by Fredegunda's agents at Vitry (575) Chilperic's sons by Audovere also died suddenly, and in 584 Chilperic was murdered, and contemporary historians accuse the Queen of instigating all three murders Unsuccessful in her efforts to kill Brunhilda and her son Childebert, she made war on Austrasia after Childebert's death (595), obtained possession of Paris and other cities in 596, but died in the following year See BRUNHILDA

FRED'ERIC, HAROLD (1856–98) An American novelist and journalist He was born in Utica, N Y, Aug 19, 1856, and was London correspondent of the New York *Times* from 1884 till his premature death in Hornby, England, Oct 19, 1898 He was educated in Utica, worked at journalism there, in Albany, and in New York, but won distinction for novels, chiefly of rural life in central New York, written after his going to England His first important story, *Seth's Brother's Wife* (1887), was followed by *The Lawton Girl* (1890), *In the Valley* (1890), a story of 1777, *The Return of the O'Mahoney* (1892), *The Copperhead* (1894), a story of the Civil War, and *Marsena* (1895), a collection of keenly humorous character stories All these, however, were surpassed by *The Damnation of Theron Ware* (1896, 1912), a brilliant analysis of religious life in the American middle class, minutely realistic in detail, clever in conversation, and unfailing in insight, immediately recognized by the public as a human document His last works, *March Hares* (1896), *Gloria Mundi* (1898), and *In the Marketplace* (1899), were less significant *The New Exodus* (1892) was a study of anti-Semitism, the result of a visit to Russia, undertaken in 1891

FREDERICH, frā'de-rĭk, BERTHA (pseudonym, GOLO RAIMUND) (1825–82) A German novelist, born at Hanover She was the wife of Eduard Frederich, editor of the *Hannoversche Courier*, in which paper her first efforts appeared In order to conceal her identity more effectually, she not only chose the above pseudonym, but managed to have the true authorship of her novels ascribed to a fictitious personage, "Georg Dannenberg" She wrote, in all, about 22 novels, nearly all of which have been republished Among them are *Bauernleben* (3d ed, 1888), *Zwei Braute* (4th ed, 1888), *Schloss Elkrath* (3d ed, 1885), *Von Hand zu Hand* (2d ed, 1885), *Mein ist die Rache* (3d ed, 1885), *Zwei Menschenalter* (3d ed, 1886), *Ein deutsches Weib* (5th ed, 1886)

FREDERICIA, frĕd'ĕr-ĭs'ĭ-a, or **FRIEDERICIA.** A seaport of Denmark, situated on the east coast of Jutland, on a projecting tongue of land, at the northern entrance to the Little Belt (Map Denmark, C 3) The town is surrounded by fortifications, now falling into ruins, and has a famous bronze statue, "The Danish Soldier," by Bissen, erected in commemoration of the victory of the Danes over the Schleswig-Holstein forces in 1849 Fredericia is connected with Middelfort, a seaside resort on the island of Funen, by steamer, has manufactures of tobacco, salt, hats, cotton goods, and chicory, and carries on a considerable trade in exports of meat, fish, eggs, and imports of pottery, salt and petroleum Pop, 1901, 12,714, 1911, 14,228

FRED'ERICK A city and the county seat of Frederick Co, Md, 60 miles west-northwest of Baltimore, on the Baltimore and Ohio and the Pennsylvania railroads (Map Maryland, E 2) It is situated in a beautiful and fertile valley near the famous battlefields of Monocacy and South Mountain It is the seat of a State institution for the deaf and dumb, and of the Women's College (Reformed church), organized in 1893, and has Frederick College and St John's Literary Institute, and Frederick City and Emergency hospitals There are large canning establishments, brickworks, planing mills, a foundry, knitting mills, and manufactures of flour, tobacco, fibre brushes, hosiery, leather, shutter fasteners, and coaches The government is administered under a charter of 1898 by a mayor, elected every three years, who controls the appointments to all municipal offices except that of city register, and a council elected at large The city owns and operates its electric-light plant Pop, 1900, 9296, 1910, 10,411, 1914 (U S est), 10,886, 1920, 11,066 Frederick has been made famous by Whittier as the scene of Barbara Frietchie's exploit Francis Scott Key, the author of "The Star-Spangled Banner," is buried in Mount Olivet Cemetery, and a splendid monument to him marks its entrance, and the remains of Roger B Taney (q v)

lie in the burial grounds of the Roman Catholic church. Frederick was first settled in 1745 and was incorporated in 1817. In 1755 Washington met Braddock here to prepare for the expedition against the French. Near by Robert Strawbridge, in 1764, organized a Methodist church, "the first in Maryland and America" Consult a sketch in Powell's *Historic Towns of the Southern States* (New York, 1900)

FREDERICK A city and the county seat of Tillman Co, Okla, 150 miles southeast of Oklahoma City, on the St Louis and San Francisco and the Wichita Falls and Northwestern railroads (Map Oklahoma, C 4) It is in a productive agricultural region and has extensive interests in cotton, cottonseed oil and cake, alfalfa, wheat and poultry The water works are owned by the city Pop, 1900, 2036, 1910, 3027.

FREDERICK (FRIEDRICH MARIA ALBRECHT WILHELM KARL) (1856–) Archduke of Austria Born at Gross-Seelowitz, near Brunn, he was a great-grandson of the Emperor Leopold II, grandson of the Archduke Charles Louis John, the great Austrian general in the campaign of 1809 against Napoleon, and a son of the Archduke Charles Ferdinand (d 1874) His sister Maria Christina married Alfonso XII of Spain In 1878 Frederick married Isabelle, Princess of Croy-Dulmen, who bore him one son, Albert (b 1897), and six daughters, one of whom, Isabelle Marie (b 1888), married Prince George of Bavaria in 1912 and was separated from him in 1913 The archduke's training was almost entirely military, and he became general of infantry and army inspector (1905) and commander of the Landwehr (1907) This position made him the natural successor in military matters of Prince Francis Ferdinand (q v), upon whose death he became practically chief commander of the Austro-Hungarian forces For this command in the great War of 1914 he was especially fitted by his close intimacy with the German Kaiser (See WAR IN EUROPE) His Vienna palace contains the remarkable Albertina collection of engravings and drawings.

FREDERICK, CHRISTIAN AUGUST (1829–80), Duke of Schleswig-Holstein-Sonderburg-Augustenburg, and claimant to the duchies of Schleswig and Holstein He was born on the island of Alsen and was educated at Bonn After the unsuccessful revolt of Schleswig-Holstein against Danish rule the ducal family was banished Frederick was very popular, however, and when, after the War of 1864, the rule of Denmark in the duchies was terminated, he triumphantly entered Kiel But political complications prevented the formal reinstatement of the dynasty By the Treaty of Vienna (October, 1864), the duchies had been relinquished to Prussia and Austria, to be disposed of by them Prussia was not inclined to permit the creation of a new German state and imposed conditions upon Frederick which made it impossible for him to assume the government After the Peace of Prague, which terminated the Austro-Prussian War of 1866, the lands were finally absorbed into the Kingdom of Prussia Frederick served on the staff of the Crown Prince, Frederick William of Prussia, during the Franco-German War of 1870–71 His daughter, Augusta Victoria, became the wife of Emperor William II of Germany Consult Samwer, *Herzog Friedrich* (Wiesbaden, 1900)

FREDERICK I (c 1121–90) Holy Roman Emperor from 1152 to 1190, surnamed Barbarossa or Redbeard He succeeded his father, Frederick, as Duke of Swabia, in 1147, and his uncle, Conrad III, as King of Germany, in 1152 On his father's side he belonged to the Hohenstaufen family, on his mother's side to the Guelphs In the early years of his reign Frederick reduced Germany to order and then proceeded to reestablish the Imperial authority in Italy The Lombard cities, with Milan at their head, flourishing and powerful, and strengthened by the papal power in their opposition to the Imperial pretensions, were prepared to resist Frederick's attempt to subjugate them After receiving the Lombard crown at Pavia, Frederick marched in 1155 to Rome, reinstated the authority of Pope Adrian IV, to whom he delivered up Arnold of Brescia, and was crowned Holy Roman Emperor In 1158 he besieged and took Milan In the same year, after a diet held at Roncaglia, Frederick attempted to establish his rule firmly over the Lombard cities Although the cities submitted for the moment, they soon rebelled In 1159 began the long contest between Frederick Barbarossa and Pope Alexander III, the successor to Adrian IV The Emperor created an antipope in the person of Victor IV, the first of several antipopes set up by him The city of Crema was reduced by Frederick after a long siege in 1160, and in 1161–62 he besieged and took Milan and razed it to the ground Frederick was triumphant everywhere, but in 1167 the Lombard cities formed a league against him and renewed the struggle Frederick was completely defeated at Legnano in 1176, and in 1183, in a peace concluded at Constance, he finally agreed to leave the Lombard cities the right to choose their own municipal rulers and to conclude treaties and leagues among themselves, although he retained his suzerainty over them, together with the power of imposing certain fixed taxes The difficulty of settling the Italian differences had been aggravated by the attitude of Pope Alexander III At last, in 1177, Frederick made his peace with the Pope and was enabled to turn his attention to Germany, where he had to contend with Henry the Lion (q v), Duke of Bavaria and Saxony, the powerful head of the house of Guelph By his energetic measures Frederick succeeded in thoroughly humbling his troublesome vassal and crushing the Guelph power in Germany In 1189, having settled the affairs of the Empire and proclaimed universal peace in his dominions, he resigned the government to his eldest son, Henry, and at the head of a large army set forth for the Holy Land After gaining two great victories over the Moslems at Philomelium and Iconium, he was drowned in the Calycadnus a small stream in Cilicia (1190) His remains were rescued by his son and buried at Tyre The death of Frederick, which led to the dispersion of the Crusaders before any material advantage had been obtained over the infidels, excited the deepest grief in Germany, where his memory has always been cherished as that of the best and greatest of his race Frederick made Poland tributary to the Empire, raised Bohemia to the rank of a kingdom, and erected the Margraviate of Austria into an independent hereditary duchy He was a patron of learning and enacted many admirable laws, some of which were based upon the Roman law Consult: Prutz, *Kaiser Friedrich I* (3 vols, Danzig, 1871–74), Fischer, *Kreuzzug Friedrichs I* (Leipzig,

1870), Giesebrecht, *Geschichte der deutschen Kaiserzeit*, vols v–vi (ib, 1888–95), Jastrow and Winter, *Deutsche Geschichte im Zeitalter der Hohenstaufen* (2 vols, Stuttgart, 1897–1901), for a completer bibliography, see Dahlmann-Waitz, *Quellenkunde der deutschen Geschichte* Nos 5240–5323 (8th ed, Leipzig, 1912)

FREDERICK II (1194–1250) King of Sicily from 1198 and Holy Roman Emperor from 1215 to 1250 He was a grandson of Frederick I and the son of the Emperor Henry VI and of Constance, heiress of Sicily He was born at Jesi, near Ancona, in Italy, Dec 26, 1194 His mother secured the favor of Pope Innocent III for her infant son by conceding many important privileges to the papal chair, and on the death of Constance, in 1198, the Pope became the guardian of the young Prince As early as 1208 Frederick assumed the reins of government in his realm, which included south Italy in addition to Sicily Supported by the Pope, Frederick, in 1212, engaged in a contest for the Imperial throne of Germany, with Otho IV, who had as yet not succeeded in securing himself in its possession after his long struggle with the rival claimant, Philip of Swabia, assassinated by Otho of Wittelsbach, in 1208 The blow dealt to Otho IV by Philip Augustus of France in 1214, in the battle of Bouvines, secured the triumph of Frederick, who was crowned at Aix-la-Chapelle in 1215 On his coronation Frederick took a vow to go on a crusade Having secured the election of his son Henry as King of the Romans, and leaving Archbishop Engelbert of Cologne as his vicegerent, he went to Italy and was crowned Emperor at Rome, by Pope Honorius, in 1220 Frederick now devoted himself to the task of organizing his Italian territories He founded the University of Naples, gave encouragement to the medical school of Salerno, invited to his court men of learning, poets, and artists, and commissioned his chancellor, Petrus de Vineis, to draw up a code of laws Frederick, however, was hampered in his projects by the refractory conduct of the Lombard cities, which in 1226 renewed the league formed against Frederick Barbarossa, and still more by the opposition of the popes As he delayed going on a crusade, he was threatened with excommunication unless he fulfilled his pledge Being compelled to depart on this expedition, he made the necessary preparations for its prosecution and actually started in 1227. He returned in three days, saying that he was ill, whereupon Gregory IX, the successor to Honorius III, excommunicated him In 1228 Frederick again set out for the Holy Land This second expedition proved successful, and in 1229 Frederick made a 10 years' truce with the Sultan of Egypt, who gave up Jerusalem and the territory around Jaffa and Nazareth, Frederick crowning himself King of Jerusalem The rest of his life was spent in attempting to bring his rebellious Lombard subjects to subjection and in struggles with Popes Gregory IX and Innocent IV, who had both excommunicated him He died suddenly in 1250 Frederick II was famed for his talents and for his varied learning, he gathered scholars and men of letters about him. Some excellent poetry, highly praised by Dante, was written at his court He was tolerant in matters of religion and in his reforms showed himself far in advance of his time His strong sympathies with his Italian motherland and his unremitting endeavors to establish a compact and all-supreme empire in Italy were the causes, not only of his own misfortunes, but of the miseries which he brought upon Germany, for, by embroiling him in costly wars abroad, they led him to neglect the welfare of his German subjects Consult Huillard-Bréholles, *Historia Diplomatica Friderici Secundi* (12 vols, Paris, 1852–61), Jastrow and Winter, *Deutsche Geschichte im Zeitalter der Hohenstaufen* (2 vols, Stuttgart, 1897–1901), Winkelmann, *Kaiser Friedrich II* (2 vols, Leipzig, 1889–97), Hampe, "Kaiser Friedrich II" in *Historische Zeitschrift*, vol lxxxiii (Munich, 1900), Allshorn, *Stupor Mundi The Life and Times of Frederick II* (London, 1912) For a fuller bibliography, see Dahlmann-Waitz, *Quellenkunde der deutschen Geschichte* (8th ed, Leipzig, 1912), Blondel, *Etude sur la politique de l'empereur Frédéric II en Allemagne* (Paris, 1892), Folz, *Kaiser Friedrich II und Papst Innocenz IV* (Strassburg, 1905). See HOHENSTAUFEN

FREDERICK III (1415–93) Holy Roman Emperor from 1440 to 1493, as German King, Frederick IV He was the son of Ernest, Duke of Austria, and was born Sept 21, 1415 After the death of the Emperor Albert II, in 1439, he was elected his successor in 1440, and two years afterward he was solemnly crowned at Aix-la-Chapelle Ten years later he received the Imperial crown at the hands of the Pope. In the Concordat of Vienna with the papacy, concluded in 1448, in the bringing about of which the Emperor's adviser, Æneas Sylvius (the future Pius II), had an important share, the church in Germany sacrificed the advantages obtained by the restrictions imposed upon papal authority at the Council of Basel Frederick's only desire was to increase the hereditary possessions of his house He failed to get the crown of Hungary, to which he laid claim, and even lost possession of Austria for a time, Vienna itself falling into the hands of the Hungarian King, Matthias Corvinus He did nothing to check the progress of the Turks He died in 1493, after an inglorious reign of 53 years In 1477 he married his son and successor Maximilian to Mary, the heiress of Charles the Bold of Burgundy. In 1486 Maximilian was elected King of the Romans, and Frederick had to resign the government to him From his time the Imperial dignity continued permanently in the house of Austria Consult Æneas Sylvius, *Historia Rerum Friderici III* (Strassburg, 1685), Coxe, *House of Austria*, vol i (4th ed, London, 1864), Bachmann, *Deutsche Reichsgeschichte im Zeitalter Friedrichs III und Maximilian I* (2 vols, Leipzig, 1884–94)

FREDERICK I (1371–1440) First Elector of Brandenburg, of the house of Hohenzollern, successor (1398) of his father, Frederick V, Burgrave of Nuremberg He served in the Hungarian army and rescued King Sigismund at the battle of Nicopolis (1396) In 1401 he married Elizabeth of Bavaria For the support which he gave to Sigismund as candidate for the Imperial crown, he was invested in 1417 with the electoral dignity in Brandenburg (of which he had been administrator for seven years), thus becoming the founder of the royal Prussian dynasty Frederick quarreled with Sigismund in 1423. He sold his rights as Burgrave of Nuremberg to the city in 1427 In 1438 he was a candidate for the throne of Germany Consult Brandenburg, *Konig Sigmund und Kurfürst Friedrich I* (Berlin, 1891)

FREDERICK III, ELECTOR OF BRANDENBURG See FREDERICK I, King of Prussia

FREDERICK I (c 1471–1533) King of Denmark and Norway from 1523 to 1533 With his elder brother John he was joint ruler of the duchies of Schleswig and Holstein at the time his nephew Christian II was dethroned (1523) Frederick was elected to succeed him A long war, waged for the possession of Norway, ended in his favor (1524) He showed great cruelty to his unfortunate relative, whom he detained in close captivity, but he was an able ruler He embraced the Lutheran faith, which spread in his dominions He granted the nobility many privileges at the cost of the power of the throne He also lost much of his control over cities, especially the seaport towns

FREDERICK II (1534–88). King of Denmark and Norway, son of Christian III He was born at Hadersleben and succeeded to the throne when only two years old Under his reign the independent Ditmarsh Republic in West Holstein was conquered in 1559, from 1563 to 1570 he was at war with Sweden During the period of peace that closed his reign he suppressed piracy on the North and Baltic seas, erected the fortress of Kronborg, and by his ability and upright life greatly endeared himself to his subjects Consult *Danmarks Riges Historie* (3 vols, Copenhagen, 1897–1905)

FREDERICK III (1609–70) King of Denmark from 1648 to 1670 He was the son of King Christian IV and was born in Hadersleben He was made Archbishop of Bremen in 1634 and Bishop of Verden in 1635 On the death of his father, in 1648, he became King of Denmark and Norway The country had been reduced by war to a state of great misery, but Frederick nevertheless plunged into a struggle with Sweden (1657) in the hope of regaining the provinces which had been lost by the Treaty of Bromsebro in 1645 Poland, Brandenburg, and Holland were his allies Charles X of Sweden invaded Jutland, overran Funen and Zealand, and forced Frederick to sign the Treaty of Roeskilde, Feb 28, 1658, by which a number of the Danish islands and a portion of Norway were ceded to Sweden Hostilities were resumed by the Swedes in the same year, but Frederick, with the aid of Brandenburg, succeeded in expelling the Swedes from Jutland, and Charles X was compelled to raise the siege of Copenhagen in 1659 Abandoned, however, by his allies, Frederick was forced to conclude peace in 1660 on the most unfavorable terms, being obliged to relinquish all claims to the territories which Denmark had possessed in the Swedish part of the Scandinavian peninsula In the latter part of his reign the nature of the government was changed to an hereditary and absolute monarchy by the voluntary act of the commons and clergy. In 1666–67 he fought a war, of minor importance only, with England In 1667 he added Oldenburg and Delmenhorst to his realm Consult Lind, *Kong Frederik III's Somagt* (Odense, 1896)

FREDERICK V (1723–66). King of Denmark from 1746 to 1766 He was the son and successor of Christian VI and one of the best and wisest of the absolute monarchs of his time With the exception of a threatened attack by Peter III of Russia, nothing disturbed the peace of his reign, owing to the skill of his Minister, Bernstorff Denmark owed to him the increase of her national wealth and the encouragement of various branches of commerce and manufacture Frederick established the Asiatic Company, opened the American colonial trade to all his subjects, founded the military academy of Soro in Denmark, and caused schools to be opened at Bergen and Trondhjem in Norway for the instruction of the Laplanders He established academies of painting and sculpture at Copenhagen and introduced the culture which was prevalent in Europe at this time into his own court

FREDERICK VI (1768–1839) King of Denmark from 1808 to 1839 and of Norway from 1808 to 1814 He was the son of Christian VII and Caroline Matilda of England, and assumed the regency in 1784, on account of the insanity of his father, on whose death, in 1808, he ascended the throne He himself was a semi idiot, but nevertheless his reign is one of the most eventful in Danish history During his reign serfdom was abolished in Denmark and Schleswig-Holstein, monopolies were abrogated, the criminal code was amended and the slave trade prohibited, the Jews received civil rights, and freedom of the press was granted All this was largely the work of Frederick's great Minister, Bernstorff (q v) In 1800 Denmark joined the armed neutrality of the North, formed against England by Russia, Sweden, and Prussia This led to the seizure by England of all Danish vessels in British ports, and to the dispatch of a powerful fleet, under Sir Hyde Parker and Nelson, to force the Regent to withdraw from the convention His refusal was followed by a fierce naval engagement at Copenhagen (April 2, 1801), in which the Danish fleet was almost wholly destroyed without even a declaration of war A peace was concluded on the Regent's withdrawal from the confederation, but in consequence of his persistence in maintaining an attitude of neutrality, instead of combining with Great Britain against Napoleon, the war was renewed in 1807 by the appearance before Copenhagen of a British fleet Copenhagen was bombarded for three days (September 2–5), the arsenals and docks destroyed, and all the shipping disabled, sunk, or carried to England This blow paralyzed the national resources and brought ruin on the country In retaliation Frederick became the ally of Napoleon and suffered in consequence In 1814 Norway was taken by the allies from Denmark and given to Sweden The state became bankrupt, and many years passed before order could be restored to the finances Notwithstanding his autocratic tendencies, Frederick so far yielded to the movements of the times as to establish representative provincial councils in 1831–34 In the last two years of his reign the demand for a constitutional government took root and rapidly extended over the whole country Consult Giessing, *Zur Regierungsgeschichte Friedrichs VI* (Kiel, 1851–52), and Thorsoe, *Fra Frederik VI's Hofkredse* (Copenhagen, 1898)

FREDERICK VII (1808–63) King of Denmark from 1848 to 1863 He succeeded his father, Christian VIII, who died Jan 20, 1848. Frederick promulgated the Unionist constitution devised by his father The principal events of his reign were the wars and diplomatic negotiations arising out of the revolt of the duchies of Schleswig and Holstein, and the dispute over the succession to Denmark proper and the duchies, on the death of the King and of his uncle, the heir presumptive, both of whom were childless. See SCHLESWIG-HOLSTEIN.

FREDERICK VIII (1843–1912) King of Denmark He was the eldest son of Christian IX and of Louise of Hesse-Cassel He was educated in a grammar school and fought in the War of 1864 After studying for some time at Oxford and traveling abroad, he married, in 1869, Princess Luise of Sweden, a niece of Oscar II He succeeded to the throne on the death of his father, Jan 29, 1906 King Frederick died suddenly in Hamburg (May 14, 1912), and for several hours his body was not identified He was succeeded by his eldest son, Prince Christian (See CHRISTIAN X) The King's second son, Charles, became, in 1905, King of Norway under the title Haakon VII (q v) Frederick was a brother of Queen Alexandra of England and of King George I of Greece

FREDERICK III, called THE FAIR (c 1286–1330) German King and Duke of Austria He failed to gain the throne after the death of his father, Albert I, and he quarreled with his cousin Louis IV, Duke of Upper Bavaria, who defeated him at the battle of Gammelsdorf in 1313 After the death of Henry VII, who had succeeded Albert I, a minority of the electors chose Frederick as German King (1314), and he was crowned by the Archbishop of Cologne, his cousin Louis was the choice of the majority of the electors War was continued between the two rivals until Frederick was defeated and captured at Muhldorf in 1322 He was released from captivity in 1325, but shortly afterward returned to the custody of Louis according to a previous agreement between the two His return to captivity is referred to by Schiller in the poem *Deutsche Treue*

FREDERICK II (1720–85). Landgrave of Hesse-Cassel He was educated at Geneva, fought in the War of the Austrian Succession and (in 1745) against the Stuart pretender in Scotland, and succeeded his father, William VIII, in 1760 He contributed greatly to the improvement of Cassel, particularly its Museum, its Academy of Fine Arts, and a number of the fine buildings To provide for his lavish expenditures, he sold a corps of 12,000 soldiers to England during the war of that country with the American Colonies

FREDERICK II, called PRINCE OF HOMBURG (1633–1708) A German general, Landgrave of Hesse-Homburg He entered the Swedish service in 1654, and at the siege of Copenhagen in 1659 lost his left leg The artificial leg with silver trimmings which he wore gave him the nickname "mit dem silbernen Beine" He was made general of cavalry by the Great Elector of Brandenburg, Frederick William, and had a great share in the victory over the Swedes at Fehrbellin in 1675 In 1681 he succeeded his brother, George Christian, in Hesse-Homburg He restored and improved Homburg, now one of the most beautiful spas of Germany He married three times the widow of Oxenstierna (1661), Louise of Courland (1670), and Sophie Sibylle von Leiningen (1691) Seven of his 15 children survived him Von Kleist's play *Prinz Friedrich von Homburg* gives an entirely incorrect idea of his character Consult the biographies by Hamel (Berlin, 1861) and Jungfer (ib , 1890)

FREDERICK I (1425–76) Elector Palatine, called the Victorious. At the death of his father, in 1439, a portion of the Palatinate devolved upon him, which he later ceded to his brother, Louis IV In 1449, upon the death of Louis, he assumed the guardianship of his infant nephew Philip and administered the government In 1451, the country being troubled by warlike neighbors, Frederick persuaded the estates to invest him with the dignity of Elector for life, with the understanding that his children should not rank as princes, and that the succession should devolve upon his nephew He was one of the opponents of the Emperor Frederick III and tried to dethrone him His allies turned against him, but he defended himself ably and in 1462 won a great victory over his enemies at Seckenheim His success secured him undisturbed possession of his principality until his death The territory of the Palatinate was greatly increased during his reign Consult Menzel, *Kurfurst Friedrich der Siegreiche von der Pfalz* (Munich, 1861), and Feeser, *Friedrich der Siegreiche* (Neuburg, 1880)

FREDERICK II (1482–1556) Elector Palatine, surnamed the Wise He was the fourth son of Philip the Magnanimous and assumed the electoral crown in 1544, succeeding his brother Louis When, in 1529, the Sultan Solyman besieged Vienna, Frederick assumed command of the Imperial army In 1535 he married Dorothea, daughter of Christian II, ex-King of Denmark Through the teaching of Melanchthon he became familiar with the principles of the Reformation and joined the Schmalkald League In later life he signed the Augsburg Interim Consult Rott, *Friedrich II von der Pfalz und die Reformation* (Heidelberg, 1904)

FREDERICK III (1515–76) Elector Palatine, surnamed the Pious He succeeded his father, John II, in the ducal possessions of the Simmern Palatinate in 1557 and upon the extinction of the elder Palatine line became Elector Palatine in 1559. From Lutheranism, which he embraced in 1546, he passed over in 1561 to Calvinism and aroused the hatred of the Lutheran princes He lent aid to the adherents of the reformed religion in France and in the Netherlands He laid the foundation of systematic Calvinism by causing the Heidelberg Catechism to be drawn up in 1563, devoting his personal attention to the work Consult A Kluckhohn, *Friedrich der Fromme* (Nordlingen, 1877–79) and *Briefe Friedrichs des Frommen*, ed by Kluckhohn (Brunswick, 1868–72)

FREDERICK IV (1574–1610) Elector Palatine, surnamed the Upright He was the son of the Elector Louis VI and Elizabeth of Hesse His father died during his infancy, and Frederick succeeded to the throne in 1583, under the guardianship of his uncle, John Casimir, assuming the reins of government in 1592, upon his uncle's death Through his influence the Protestant Union was formed in 1608 He raised Mannheim, where many Protestants had taken refuge, to the dignity of a town, and his reign is characterized by firm devotion to the Protestant cause Consult L Hausser, *Geschichte der rheinischen Pfalz* (Heidelberg, 1856), and M Ritter, *Geschichte der deutschen Union* (Schaffhausen, 1867–73)

FREDERICK V (1596–1632) Elector Palatine and King of Bohemia He was the third son of the Elector Frederick IV, whom he succeeded in the Palatinate in 1610 He married, in 1613, Elizabeth, the daughter of James I of England, through whose ambitious counsels he was induced to take a prominent part in the proceedings of the union of the Protestant princes of Germany, and finally, although against his own inclinations, to accept the dignity of

King of Bohemia in 1619 His complete defeat at the battle of the White Hill, November, 1620 (see THIRTY YEARS' WAR), terminated his short-lived enjoyment of the regal crown, of which he retained no other memorial than the mocking title of "the Winter King" The rest of his life was spent in exile, under the ban of the Empire, and with resources obtained from the generosity of his friends In 1623 he was declared to have forfeited his electoral title and his dominions in the Palatinate The electoral dignity and the Upper Palatinate were conferred upon his cousin, Maximilian of Bavaria, the head of the Catholic League Frederick's daughter Sophia became the wife of the first Elector of Hanover and the mother of George I of England Her daughter married Frederick I of Prussia and was the grandmother of Frederick the Great He died at Mainz, Nov 20, 1632 Consult Gindely, *Geschichte des dreissigjahrigen Krieges* (Prague, 1869–80), M Ritter, "Friedrich V," in the *Allgemeine deutsche Biographie*, vol vii (Leipzig, 1878), J. Krebs, *Die Politik des evangelischen Union in Jahre 1618* (Breslau, 1890–1901), *Deutsche Lieder auf den Winterkonig*, ed by R. Wolkan (Prague, 1899).

FREDERICK I (1657–1713). The first King of Prussia, from 1701 to 1713, previous to his assumption of the royal title, Elector of Brandenburg (1688–1701), as Frederick III He succeeded his father, Frederick William, the Great Elector of Brandenburg, in 1688 His name is a synonym for vanity and extravagance, but his subjects, nevertheless, loved him He modeled his life and his court after Louis XIV of France. In the first half of his reign his main concern was the acquisition of the royal title, in which endeavor he was assisted by the difficult position of the Emperor Leopold I, who pledged his consent, after a year of negotiation, on the eve of the outbreak of the War of the Spanish Succession In return for the Imperial permission Frederick was to furnish a considerable body of troops His troops helped to win the day for the allies on more than one occasion, yet at the Peace of Utrecht his only reward was a small district in Gelderland In this treaty Prussia was, however, recognized in the possession of Neuchâtel, which had fallen to her by inheritance Frederick I is remembered to-day as the patron of learned and liberal-minded men—of Spener, Francke, and Thomasius, and, above all, of Leibnitz He is also known as the founder of the Order of the Black Eagle, which is still considered the greatest mark of distinction that a king of Prussia can bestow He also founded the University of Halle Frederick died Feb 25, 1713, after having drained Prussia of all her financial resources Consult Henderson, *Short History of Germany* (New York, 1902), Pierson, *Preussische Geschichte* (Berlin, 1898), Friedensburg, *Historische Zeitschrift*, vol li, pp 407–432 (Munich, 1901)

FREDERICK II (1712–86). King of Prussia from 1740 to 1786, known as THE GREAT He was born Jan 24, 1712, and was the son of Frederick William I (q v) of Prussia and of Sophia Dorothea, daughter of George I of England The plan of education pursued by his father soon tended to render their relations unbearable Frederick William insisted on instilling into his son his own practical instincts and stifled the literary and artistic impulses which Frederick manifested at an early age At last Frederick determined to escape the parental tyranny by flight to England The plan was discovered, and the most severe punishment followed Frederick's aider and abettor, Lieutenant Katte, was beheaded before his eyes, and the Prince himself was led to expect a similar fate The father, however, relented, and Frederick was placed, instead, in the War and Domain Bureau at Custrin and made to work as an assistant clerk Here he learned most valuable lessons with regard to the task of administering a great kingdom A reconciliation finally took place between father and son The only act which Frederick never forgave his father was his forced marriage, for reasons of state policy, with Elizabeth of Brunswick-Bevern, whom he respected but never loved

Frederick's great wars fall in the first half of his reign Almost immediately after his accession, on the news of the death of the Emperor Charles VI and the accession of his daughter, Maria Theresa, in the Hapsburg dominions, he invaded Silesia, basing his claim to a large part of the country on an old transaction in which Austria had played a grasping and dishonest part (See SUCCESSION WARS) In the first battle of the Silesian campaign—that of Mollwitz, April, 1741—Frederick's general (Schwerin) found the situation so critical that he urged the King to fly for his life, and Frederick did not know until the next day that he had won the victory Mollwitz gained for Frederick the French alliance which practically decided the campaign After the victory of Frederick at Chotusitz, Maria Theresa agreed to the Peace of Breslau (1742), in which France, however, was not included In this treaty Austria ceded most of Silesia to Prussia Two years later Frederick reentered the struggle, ostensibly as the champion of the Emperor, the Bavarian Charles VII France was still his ally, while Maria Theresa could count on England, Saxony, and Holland Frederick took Prague, but was forced to abandon the city and make a disastrous retreat He soon retrieved his fortunes, however, at Hohenfriedberg (June, 1745), and his victory over the Saxons at Kesseldorf (December, 1745) was followed by the Treaty of Dresden, which was a repetition of the Peace of Breslau In 1756 Maria Theresa, inconsolable for the loss of Silesia, formed an alliance against Prussia with France (the old enemy of the Hapsburgs), Russia, Saxony, and Sweden England, as the enemy of France, now sided with Frederick The King of Prussia at once descended upon Saxony, thus opening the great struggle which involved all the European powers and their colonies (See SEVEN YEARS' WAR) The outcome of this gigantic conflict, which was the culmination of Frederick's military career, but which taxed the resources of his little kingdom to their utmost, left Prussia in 1763 territorially unchanged and in the enjoyment of great military prestige

Frederick had come through the war without incurring a national debt or increasing the direct taxes, on the other hand, he had inflated the currency, but by wise measures he soon put the finances of Prussia on a sound basis. He practiced the most rigid economy in the royal household and was enabled to spend large sums in agricultural and industrial improvements. He reclaimed thousands of acres of waste land by a system of canals and drainage, peopled them with colonists, and set on foot a large

FREDERICK THE GREAT
FROM A PAINTING BY GEORGE MEYN

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number of industries, visiting at intervals every part of his dominions He began a codification of the law, abolished serfdom within the royal domains, insisted on the impartial administration of justice, granted freedom of speech, and, at least in literary and scientific matters, liberty of the press Tolerant towards every form of religious belief, he was one of the most intolerant of autocrats towards his ministers. To his enlightened despotism were due the regulation of customs and the equalization of taxation He grimly put a tax on the hired Hessians that passed through his dominions, as "on cattle bought and sold" Frederick took a great interest in the American Revolution and admired and appreciated the greatness of Washington, and was one of the first sovereigns to conclude a commercial treaty with the United States The desertion of Prussia by England at the critical period in the Seven Years' War had inspired in Frederick a bitterness towards the latter country which permanently influenced his foreign policy On the other hand, he had drawn closer to Russia after the death of his uncompromising enemy, the Empress Elizabeth, and he and Catharine II were able to see their value as allies to each other, hence the partition of Poland

Frederick's relation to the intellectual development of Germany was peculiar Although Prussia had become through him one of the great continental powers, he had no sympathy whatever with German national aspirations While he foresaw the future literary greatness of Germany, he ignored the eminent writers who were appearing upon the scene and despised the German language, which he never wrote with ease French he spoke and wrote fluently, though he did not spell it correctly He cultivated the society of French writers and scholars, among them Voltaire and Maupertuis, whom he invited to Sans-souci He was consistent in his admiration of Voltaire, though not blind to his personal weaknesses Conversation with his literary friends, and playing on the flute, on which he was a really skillful performer, were Frederick's only relaxation from incessant work. He was a voluminous writer Of his numerous works, the most important are *Mémoires pour servir à l'histoire de Brandebourg, Histoire de la guerre de Sept Ans,* and the *Anti-Macchiavel,* written before he became King, in which he laid down his views on government The Berlin Academy published an edition of his collected works (30 vols, ed by Preuss, 1846–57).

Throughout his reign Frederick took the greatest interest in the improvement of the Prussian army He wrote for the guidance of his generals a number of works covering the whole science of war. The army, which numbered 80,000 men when he ascended the throne, was increased to nearly 200,000 in his lifetime Frederick died, Aug 17, 1786, at Sans-souci

Consult Tuttle, *History of Prussia under Frederick the Great* (3 vols, Boston, 1888), the best work in English, unfortunately cut short at 1757 by the death of the scholarly author; Longman, *Frederick the Great and the Seven Years' War* (New York, 1881), a useful little compendium Carlyle, *History of Frederick II* (London, 1888), is, on the whole, inadequate as history. These are the principal useful works in English The greatest living authority is Koser, whose *Friedrich der Grosse als Kronprinz* (Stuttgart, 1903) is a small classic He has also written a larger history, *Geschichte Friedrichs des Grossen* (4 vols, ib, 1912–14) Consult also Lavisse, *La jeunesse du grand Frédéric* (Paris, 1891; 3d ed, 1899) and *Le grand Frédéric avant l'avènement* (ib, 1893), Preuss, *Friedrichs des Grossen Lebensgeschichte* (Berlin, 1832–34), Kugler, *Geschichte Friedrichs des Grossen* (12th ed, Leipzig, 1887), and numerous other general and special studies, a bibliography of which may be found in Lavisse and Rambaud, *Histoire générale,* vol vii (Paris 1893–1900), Bordeau, *Le grand Frédéric* (2 vols, ib, 1900–02), J. W Whittall, *Frederick the Great on Kingcraft* (New York and London, 1901), L Paul-Dubois, *Frédéric le grand, d'après sa correspondance politique* (Paris, 1903), F T Kugler, *Life of Frederick the Great* (London, 1903), W F Reddanay, *Frederick the Great and the Rise of Prussia* (ib, 1904), G Winter, *Friedrich der Grosse* (Berlin, 1907), G L Mamlock, *Friedrichs des Grossen Korrespondence mit Aertzen* (Stuttgart, 1907), G B Volz, *Aus der Zeit Friedrich der Grossen* (Gotha, 1908), A Kohut, *Friedrich der Grosse als Humorist* (Leipzig, 1908), E Daniels, *Frederick the Great and his Successor,* in "Cambridge Modern History" (London, 1909).

FREDERICK III (1831–88) German Emperor and King of Prussia from March 9 to June 15, 1888 Before his accession to the throne he was known as Frederick William He was the only son of William I, King of Prussia and first Emperor of united Germany, and was born Oct 18, 1831 His earnest character and decided talents were developed under the care of excellent masters, among others Ernst Curtius (q v), who accompanied him to the University of Bonn, where the Prince was matriculated in the law faculty After the completion of his education the Prince visited several foreign countries In England he became attached to the Princess Royal, Victoria, to whom he was married, Jan 25, 1858 The marriage was highly approved by both nations, and the life of the royal couple was an exceedingly happy one After his father's accession to the throne the Crown Prince took part in the more important affairs of the state During the war with Denmark in 1864 he was sent to the scene of operations in order to exert his personal influence towards removing the friction among those in charge of affairs In the war with Austria in 1866 he commanded the Second Prussian Army, and by a forced march arrived on the scene of the battle of Sadowa in time to decide the issue In the Franco-German War he commanded the Third Army, consisting of the South German forces He won the first victory of the war, that of Weissenburg (August 4), and inflicted a decisive defeat on the army of MacMahon at Worth (August 6) Seconded by the Crown Prince of Saxony, he vanquished MacMahon at Sedan and compelled him to surrender with his whole army (September 2) Two weeks later he began the investment of Paris and had the principal share in its reduction He played a considerable part in the founding of the new German Empire, although his plans differed in some essential respects from those advocated by Bismarck. During the Emperor's illness in 1878, his public functions were discharged by the Crown Prince, who showed great ability in the performance of his duties In January, 1887, he was attacked by a

cancerous throat trouble, necessitating several surgical operations, which were heroically borne On the death of his father, March 9, 1888, he ascended the throne as Frederick III He died June 15 of the same year Liberal, cultivated, and a friend of parliamentary government, he was greatly beloved by all, especially by the army, and bore the popular appellation of "Unser Fritz." He wrote diaries of his travels in the East and of his part in the wars of 1866 and 1870–71. He had eight children, the eldest of whom is the reigning Emperor, William II (q v) Consult Gustav Freytag, *Der Kronprinz und die deutsche Kaiserkrone* (Leipzig, 1889); M von Poschinger, *Kaiser Friedrich* (3 vols, Berlin, 1898–1900), adapted into English by Sidney Whitman, *Life of Emperor Frederick* (New York, 1901), Schuster, *Briefe des Kaisers und Konigs Friedrich III* (Berlin, 1907)

FREDERICK I (1369–1428) Elector and Duke of Saxony, called the Warlike He was the son of Frederick the Stern, of Meissen. With his two brothers he succeeded, on the death of the father, in 1381, to the inheritance, but they were compelled to divide with their two uncles Frederick distinguished himself as a soldier, and in 1423, in recognition of his successes against the Hussites, Emperor Sigismund made him Elector and Duke of Saxe-Wittemberg He was defeated by the Hussites at Aussig in 1426 He and his brother founded the University of Leipzig in 1409 Among his direct descendants is the Guelph dynasty of England Consult Bottiger and Flatte, *Geschichte des Kurstaates und Konigreichs Sachsen* (3 vols, Hamburg, 1830–73).

FREDERICK II, called the Mild (1411–64) Elector and Duke of Saxony, son of Elector Frederick I He was joint heir of the family lands with his three brothers, defended Saxony against the Hussites, increased his possessions by obtaining a part of Lower Lusatia and the Burgraviate of Meissen, and succeeded in establishing his right to the Electorate of Saxony over Bernard IV, Duke of Saxe-Lauenburg From 1446 to 1451 he was engaged in a fierce struggle with his brother William over the partition of the lands of their deceased cousin, Frederick the Peaceful In 1455 an attempt was made to abduct Frederick's two sons, an event referred to in German history as the "Prinzenraub"

FREDERICK III (1463–1525) Elector and Duke of Saxony, called the Wise He was a grandson of Frederick II and succeeded his father, Duke Ernest, in the government He founded the University of Wittenberg in 1502 and called Luther and Melanchthon to chairs in the faculty He never adopted the creed of the Reformers, but he accorded them toleration, protected Luther at the Diet of Worms and sheltered him in the castle of Wartburg In 1493 he visited the Holy Land and in Jerusalem was made a Knight of the Sepulchre He brought about many reforms in the constitution of the Empire, and on the death of Maximilian I, in 1519, he was offered the Imperial throne, but declined it, and recommended Charles I of Spain, who became Emperor as Charles V Consult Kolde, *Friedrich der Weise und die Anfange der Reformation* (Erlangen, 1881)

FREDERICK III (1272–1337) King of Sicily, son of King Peter of Sicily and Aragon Upon the accession of his elder brother James to the throne of Aragon, Frederick was made Regent of Sicily, but when James surrendered the island to be held by the Church for Charles II of Anjou the Sicilians revolted and chose Frederick as their King, at Palermo, in 1296 In the war that followed Frederick met with varying success until 1302, when he concluded a favorable treaty with Charles II In 1313 he entered into an alliance with Emperor Henry VII and again made war on the Angevins, with whom he fought intermittently until the end of his reign From 1321 to 1335 he was excommunicated by the Pope Frederick's rule served to weld the Sicilians into a united nation

FREDERICK I, WILLIAM CHARLES (1754–1816) Duke, and subsequently first King, of Wurttemberg He was born at Treptow, Pomerania, and was a son of Duke Frederick Eugene and Sophia Dorothea, niece of Frederick the Great After serving in the Prussian and Russian armies, in 1797 he succeeded his father as Duke and in 1803 was invested with the electoral dignity At the close of 1805 Napoleon, in reward for his aid against Austria, erected his state into a kingdom, and on Jan 1, 1806, Frederick assumed the royal title He soon afterward joined the Confederation of the Rhine The territory over which he ruled was greatly enlarged during his reign in 1802, when he ceded territory on the left bank of the Rhine to France, he received nine Imperial towns in return, in 1805 he got some Austrian territory, and in 1809 his kingdom was further enlarged Especially after 1801, his autocratic government and subserviency to Napoleon I and the oppressive conditions of enforced conscription and excessive taxation made him an unpopular ruler Frederick joined the league against France after the battle of Leipzig and thus preserved the kingdom he had gained through aiding Napoleon Consult Pfister, *Konig Friedrich von Wurttemberg und seine Zeit* (Stuttgart, 1888), and Schlossberger's edition (ib, 1886–89) of the King's correspondence with Napoleon and with his daughter, who married Jerome of Westphalia

FREDERICK I, WILLIAM LOUIS (1826–1907) Grand Duke of Baden He was born at Karlsruhe, son of the Grand Duke Leopold and of Princess Sophia of Sweden He was educated at Heidelberg and Bonn and, after acting as Prince Regent for four years, succeeded to the government in 1856 Immediately upon his accession to the throne he restored the constitution of the grand duchy and during a rule lasting more than 50 years he zealously promoted economic and educational progress He sided with Austria in the War of 1866, but afterwards entered into close relations with Prussia and the North German Confederation In 1856 he married Louise, daughter of William of Prussia (afterward German Emperor) Consult the sketches by Dove (Heidelberg, 1902) and Lorenz (Berlin, 1902)

FREDERICK AUGUSTUS I (1750–1827) Elector (as such Frederick Augustus III) and from 1806 first King of Saxony He was the son of the Elector Frederick Christian and succeeded his father under the guardianship of his uncle, Prince Xavier, in 1763 In 1768 he was declared of age In 1769 he married Princess Maria Amelia of Zweibrucken He sided with Frederick the Great against Austria in the War of the Bavarian Succession (1778–79) and afterward joined the League of German Princes. In 1791 he was offered the crown of Poland, but

declined it In 1792 he reluctantly took up arms against France During the war between France and Austria, in 1805, he maintained a strict neutrality, but in the following year he joined Prussia against France The disastrous battle of Jena forced him to conclude a treaty of alliance with Napoleon, December, 1806 He was allowed to assume the royal title and joined the Rhenish Confederation In 1807 he was invested with the newly created Duchy of Warsaw, but was ruler of it only in name, the control being exercised by Napoleon himself During the subsequent wars of Napoleon he was a faithful ally of the Emperor He was taken prisoner by the allies after the entry into Leipzig, Oct 19, 1813, and by the decrees of the Congress of Vienna he was compelled to cede more than half of his kingdom to Prussia. He devoted the remainder of his life to the development of the agricultural and commercial resources of his kingdom, and directed his attention especially to the administration of justice Consult A Bonnefons, *Un Allié de Napoléon, Frédéric Auguste premier roi de Saxe* (Paris, 1902)

FREDERICK AUGUSTUS II (1797–1854) King of Saxony from 1836 to 1854 He was the eldest son of Prince Maximilian of Saxony and brother of Frederick Augustus I In 1830, on the outbreak of political disturbances in Dresden, he was named joint Regent of the kingdom with King Anthony In 1836 he succeeded Anthony on the throne An insurrection in Dresden in May, 1849, obliged him to avail himself of the help of Prussian troops. But, the rising once quelled, his reign continued tranquil and prosperous He died as the result of a fall from his carriage while traveling in Tirol, Aug 9, 1854 Consult F F von Beust, *Aus drei-viertel Jahrhunderten* (2 vols, Stuttgart, 1887), and F Foerster, *Friedrich August II "der Starke," Kurfurst von Sachsen* (Leipzig, 1910)

FREDERICK AUGUSTUS III (1865–) King of Saxony. He studied at Strassburg and Leipzig, entered the army in 1883, and in 1902 attained the rank of general of infantry in the Prussian service He succeeded his father George on the throne Oct 15, 1904 In 1891 he married Princess Louise of Tuscany, by whom he had five children In 1902 she eloped with André Giron, a tutor in the Prince's household, and in 1903 was divorced by her husband She received the title of Countess of Montignoso Consult the sketch by Von Metzsch (Berlin, 1906)

FREDERICK CHARLES (1828–85) Prince of Prussia He was the only son of Prince Charles, brother of Emperor William I, and was educated at Bonn His early military training he got from the great Von Roon He served with distinction in the early stage of the first Schleswig-Holstein War in 1848 and was wounded at Weisenthal in Baden (1849) He devoted himself assiduously to the study of military science and in 1858 traveled in France and studied the French army In 1860 he became commander of the Third Army Corps During the Danish War of 1864 he stormed the fortifications at Duppel (April 18, 1864) and in the following month was intrusted with the chief command of the allied forces He was commander of the First Division of the army during the conflict with Austria (1866) and, after winning the skirmishes of Podol, Munchengratz, and Gitschin in rapid succession, obstinately defended the Prussian centre at the battle of Sadowa until the arrival of the army of the Crown Prince Still more conspicuous was his leadership during the Franco-German War of 1870–71, when he commanded the Second Army, consisting of six army corps, 500 guns, and 260,000 men He defeated Bazaine at Vionville (Mars-la-Tour) on Aug 16, 1870, and two days later, seconded by General Steinmetz, at Gravelotte, ultimately compelling Bazaine to capitulate with his army of about 180,000 men and to surrender the fortress of Metz He subsequently defeated the Army of the Loire, under General Aurelle de Paladines, after a campaign of six weeks After the war he became inspector of Prussian cavalry In 1837 he married Maria Anna of Anhalt His son Frederick Leopold (1863–) married a younger sister of the German Empress, and one of his daughters, Louisa Margaret (1860–), married Arthur, Duke of Connaught Consult the biographies by Honig (Berlin, 1885) and Muller-Bohn (Potsdam, 1902)

FREDERICK FRAN'CIS II (1823–83). Grand Duke of Mecklenburg-Schwerin He was a son of Grand Duke Paul Frederick and of the Princess Alexandrine of Prussia and was educated at Bonn In 1842 he succeeded his father and was appointed general in the Prussian army, in which capacity he fought with distinction in the War of 1866 In the war with France, as commander of the Thirteenth Army Corps, he invested the fortress of Toul, which surrendered on Sept 23, 1870, and in December distinguished himself in the operations on the Loire During the siege of Paris he commanded the divisions guarding the approaches to the besieging army. A magnificent monument was erected to his memory at Schwerin in 1893 Consult the biography by Von Hirschfeld (Leipzig, 1891)

FREDERICK HENRY (1584–1647). Prince of Orange, son of William the Silent, born at Delft He was trained to arms by his elder brother, Maurice of Nassau, whom he succeeded to the paternal honors and estates in 1625 He demonstrated his generalship by capturing Hertogenbosch (1629), Maastricht (1632), Breda (1637), Sas van Ghent (1644), and Hulst (1645), and his statesmanship by concluding a treaty with Spain in which the Dutch gained every point for which they had fought so long Under his stadtholderate the Dutch Republic is considered to have reached its greatest power and influence Consult *Mémoires de Frédéric Henri* (Amsterdam, 1743)

FRÉDÉRICK-LEMAÎTRE, ANTOINE LOUIS PROSPER See LEMAÎTRE

FREDERICK LOU'IS (1707–51) Prince of Wales He was born at Hanover, Germany, the eldest son of George II and Queen Caroline He came to England at the age of 17, was made Prince of Wales in 1729, and married the Princess Augusta of Saxe-Gotha in 1736 The bitterness between him and his father and mother went to great lengths It was due in the first place to the veto on his marriage to Wilhelmina of Prussia and was aggravated by his father's stinginess towards him An attempted reconciliation in 1742 was unsuccessful The Prince was a gambler and a loose liver His son afterward came to the throne as George III and his youngest daughter married Christian VII of Denmark

FRED'ERICKSBURG. A town and the

county seat of Gillespie Co, Tex, 80 miles west of Austin and 25 miles north of Comfort, the shipping point on the San Antonio and Aransas Pass Railroad (Map Texas, C 4) Stock raising and farming are the leading industries, and there are roller mills and a tombstone factory A German colony founded Fredericksburg in 1846 The town owns its electric-light plant Pop, 1914 (local est), 3000.

FREDERICKSBURG An independent city of Virginia, 60 miles by rail north of Richmond, on the Rappahannock River at the head of tidewater, on the Potomac, Fredericksburg, and Piedmont, and the Richmond, Fredericksburg, and Potomac railroads, and on the Maryland, Delaware, and Virginia boat line (Map Virginia, G 3) The city lies in a valley inclosed by high hills and has two public libraries, several bridges across the river, a beautiful park, and the famous Stonewall (Confederate) and National cemeteries, the latter having 15,300 graves It is the seat of Fredericksburg College (Presbyterian), opened in 1893, and of a State normal school It contains also the Washington and Paul Jones homes A dam above the city, 900 feet long and 18 feet high, affords valuable water power, and there are manufactures of flour, silk, and woolen goods, iron, shoes, shirts, pickles, cigars, sumac, carriages, wheels, hubs, spokes, tanned leather, and excelsior Fredericksburg has adopted the commission form of government The city owns and operates its water works and gas and electric-light plants Pop, 1900, 5068, 1910, 5874 On the site of Fredericksburg, Capt. John Smith fought a skirmish with the Rappahannock Indians in 1608 The town was named in 1727 in honor of the Prince of Wales and incorporated in 1782 It was the home of Gen. Hugh Mercer, killed in the battle of Princeton, and of the Revolutionary officers George Weedon, William Woodford, Thomas Posey, and Gustavus B Wallace A monument has been erected in honor of Washington's mother, who died here in 1789, and a statue to General Mercer During the Civil War, Fredericksburg changed hands several times and was the scene of several battles See FREDERICKSBURG, BATTLE OF, CHANCELLORSVILLE, BATTLE OF

FREDERICKSBURG, BATTLE OF. An important battle of the Civil War in America, fought on Dec 13, 1862, at Fredericksburg, Va, between the Federal Army of the Potomac, numbering about 116,000, under General Burnside, and the Confederate Army of Northern Virginia, numbering about 78,000, under General Lee On November 15 Burnside, who on November 7, seven weeks after the battle of Antietam, had superseded McClellan as commander of the Army of the Potomac, then stationed near Warrenton, Va, started down the left bank of the Rappahannock with the intention of crossing at Fredericksburg, where he expected General Halleck to have pontoon bridges in readiness, and of marching thence on Richmond The Right Grand Division under Sumner arrived at Falmouth, near Fredericksburg, on the 17th, but could not effect a crossing, owing to the absence of bridges, and was accordingly stationed on Stafford Heights, opposite Fredericksburg Hooker and Franklin, commanding the Centre and Left Grand Division, arrived soon afterward Meanwhile Longstreet, acting under orders from Lee, hastened to Fredericksburg by forced marches, reached there on the 21st, and immediately took up a position on the hills back of the town, which he proceeded with great energy to fortify Jackson's corps arrived from the Shenandoah valley about November 30, and Jackson assumed command of the right of the Confederate army, the whole Confederate line ultimately extending for more than six miles, though it was broken in several places by streams and ravines Burnside was not ready to cross the Rappahannock until December 11, and on that day and on the 12th the Right and Left Grand Divisions succeeded in passing to the other side, though the former, which crossed directly in front of Fredericksburg, met with considerable opposition from Confederate sharpshooters concealed in a cluster of brick and stone houses on the opposite bank Hooker's Centre Grand Division crossed on the morning of the 13th and was broken up to assist the Right and Left After much hesitation and vacillation Burnside, bewildered and confused by a task far transcending his ability, finally decided upon a plan of battle, in accordance with which, about noon on the 13th, Franklin, facing Jackson at the weakest point of the Confederate line—their extreme right—ordered Meade forward, with a single division, supported by two other divisions under Gibbon and Doubleday, to seize one of the opposing heights Meade succeeded in penetrating the Confederate line, but along with Gibbon was soon forced back, so that this movement, which was the only one made by the Federal left, resulted in nothing but loss Meanwhile, on the Federal right, Sumner six times attacked the almost impregnable Confederate works on Marye's Hill, but was each time driven back with terrific loss, the Federal troops, however, displaying in each attack wonderful steadiness and gallantry The hill itself was heavily fortified At its base, and parallel to the line of battle, ran a sunken road protected by a stone wall, behind which a large force of Confederates was stationed, and the approach was such as to expose an attacking force to an irresistible rain of shot and shell At the end of the day's fighting the Federals had lost in killed, wounded, and missing 12,653, the Confederates, 5377 Burnside contemplated repeating his attack on the following day, but was dissuaded by his officers and withdrew unmolested to the left bank of the river on the night of the 15th Consult *Official Records*, vol xxi, Johnson and Buel, *The Battles and Leaders of the Civil War*, vol iii (New York, 1887), Ropes, *The Story of the Civil War*, vol ii (ib, 1898), Palfrey, *Antietam and Fredericksburg* (ib, 1882), Nicolay and Hay, *Abraham Lincoln A History*, vol vi (ib, 1890), Allan, *The Army of Northern Virginia in 1862* (Boston, 1892), Henderson, *Campaign of Fredericksburg, November–December, 1862* (London, 1886), Alexander, *Military Memoirs of a Confederate* (New York, 1907), Steele, *American Campaigns* (Washington, 1909)

FREDERICKTOWN. A city and the county seat of Madison Co, Mo, 104 miles by rail south of St Louis, on the St Louis, Iron Mountain, and Southern Railroad (Map Missouri, F 4) It is the seat of Marvin College (Methodist Episcopal, South) In the vicinity is La Motte, a lead mine in continuous operation for more than 200 years The chief industries of the city are the mining of cobalt, lead, nickel, and copper, and the manufacture of railroad ties An electric-light and power plant is owned

and operated by the municipality Pop, 1900, 1577, 1910, 2632

FREDERICK WILLIAM (1620–88) Elector of Brandenburg from 1640 to 1688, commonly called the Great Elector He was the son of the Elector George William, and was born Feb 16, 1620 On his accession he found an empty exchequer, the towns and cities depopulated, and the whole electorate devastated by the ravages of the Swedish and Imperialist armies during the Thirty Years' War, which was not yet concluded A portion of his inheritance had even been seized by the Swedes. His first acts were to regulate the finances and to conclude a treaty of neutrality with Sweden, which left him at leisure to devote himself to the organization of his army and the repeopling of the deserted towns and villages by means of immigration By the Treaty of Westphalia in 1648, he secured Further Pomerania (east of the Oder) and received the bishoprics of Halberstadt, Minden, and Kammin as lay principalities, together with the reversion of the see of Magdeburg In the course of ten years he had, by the help of his generals, Derfflinger, Schomberg, and Kannenberg, created an army of 25,000 men, organized on the Swedish model In 1856 he entered into an alliance with Charles X of Sweden against Poland and cooperated with him in the taking of Warsaw In the following year he forsook the Swedish alliance and placed himself on the side of Poland, which, in the Treaty of Wehlau, renounced its suzerainty over the Duchy of Prussia The aggressions of Louis XIV, who sought to extend the French dominions to the Rhine and made an onslaught upon Holland, alarmed the Elector, who induced the Emperor Leopold I, the King of Denmark, and the Elector of Hesse-Cassel to enter into a league against France (1672) The result was unfavorable, and Frederick William was obliged to content himself with making highly disadvantageous terms in the following year The war was soon renewed, and Brandenburg was again laid open to the incursions of the Swedes, who, at the instigation of Louis XIV, advanced upon Berlin, laying waste everything on their march The Elector, who had taken up his winter quarters in Franconia, hurried across the Elbe at the head of his cavalry and signally defeated the Swedes at Fehrbellin (June 18, 1675), driving them from his dominions. Deserted, however, by the other German princes, and his dominions overrun by the troops of Louis, he was obliged to agree to the Treaty of Saint-Germain, by which he restored all his conquests to the Swedes, in return for the withdrawal of the French army and an indemnity of 300,000 crowns After this Frederick William devoted himself to the task of furthering the prosperity of his dominions By his reception of 20,000 French Protestants, after the revocation of the Edict of Nantes (q v), and the encouragement which he afforded to the immigration of Hollanders and other foreigners, he augmented the population of his states and introduced numerous industries among his subjects It is difficult to estimate his services for they were so great as to deserve the eulogy given by Frederick the Great, *"Messieurs, celui-ci a fait de grandes choses"* He founded the University of Duisburg and the Royal Library at Berlin and reorganized the universities of Frankfort on the Oder and Königsberg He opened canals, established a system of posts, and greatly enlarged and beautified Berlin He left a well-filled exchequer and a highly organized army Consult Tuttle, *History of Prussia, 1134-1740* (Boston, 1884), Hiltl, *Der grosse Kurfurst und seine Zeit* (Bielefeld, 1893), H Landwehr, *Die Kirchenpolitik des grossen Kurfursten* (Berlin, 1894), E Heyck, *Der grosse Kurfurst* (ib, 1897-1903), Philippson, *Der grosse Kurfurst* (ib, 1897–1902), Spahn, *Der grosse Kurfurst* (Mainz, 1902), A Waddington, *Le Grand Electeur et Louis XIV* (Paris, 1905), A W. Ward, *The Great Elector and the First Prussian King*, in "Cambridge Modern History" (London, 1908), F Fehling, *Die europaische Politik des grossen Kurfurste, 1607–1688* (Leipzig, 1910)

FREDERICK WILLIAM (1771–1815) Duke of Brunswick He entered the Prussian service in 1788 and was actively engaged with the army during the war with France, which began in 1792, and after the battle of Auerstadt was taken prisoner at Lubeck (Nov 7, 1806) Frederick William joined Austria in the war against Napoleon in 1809 The defeat of the Austrians at Wagram left him isolated in central Germany, and he determined to make for the North Sea and England With 1500 men he set out from Leipzig (July 20), passed through Brunswick, where he overthrew 4000 Westphalians under Reubel, crossed the Weser, reached Elsfleth, seized all the available shipping, and sailed for England (August 7) He entered the English service with his men and afterward took part in the War of the Peninsula, where he served with distinction till his return to his own dominions in 1813 His attempts to maintain an excessive army and to force reforms upon his people made him very unpopular He joined the allied army with a force of 8000 men after the return of Napoleon from Elba, and fell while leading his men at Quatre-Bras, on June 16, 1815

FREDERICK WILLIAM I (1802–75). Elector of Hesse He was educated at Marburg and Leipzig and became Coregent in 1831 and Elector in 1847 He sided with Austria during the War of 1866, and his refusal to accede to the terms of Prussia led to the invasion of his territory In consequence of his obstinate refusal to treat with the Prussian government he was arrested and conveyed to the fortress of Stettin, and his territories were annexed by Prussia His morganatic wife, Gertrude Falkenstein (1806–82), whom he married in 1831, was the divorced wife of a Prussian lieutenant Consult the biography by Grebe (Cassel, 1902)

FREDERICK WILLIAM I (1688–1740) King of Prussia from 1713 to 1740 He was the son of Frederick I and was born Aug 15, 1688 He was in almost every particular the opposite of his father—simple and almost penurious in his habits, attending to business, passionately fond of military exercises, averse to culture, fond of the low and illiterate, and carrying to the utmost his ideas of arbitrary power and the divine right of kings. From Charles XII of Sweden he wrested a great part of Hither Pomerania, including Stettin, playing a rôle which he himself confessed was not fit for an honest man He died at Potsdam, May 31, 1740 As the founder of an administrative system, of which he himself worked out the minutest details, Frederick William stands prominent among the monarchs of his century His

childish love for tall soldiers induced him to resort to the most flagrant outrages, both at home and abroad, for kidnaping tall men and forcing them into his service The result of this system, which was greatly moderated towards the end of his reign, was that he left at his death a well-drilled army of 80,000 soldiers What was of more consequence to his son and successor was that his exchequer contained 9,000,000 thalers, and that his kingdom had attained an area of more than 45,000 square miles and a population of upward of 2,200,000 Consult Tuttle, *History of Prussia, 1134–1740* (Boston, 1884), Forster, *Geschichte Friedrich Wilhelms I* (Potsdam, 1835), Carlyle, *History of Friedrich II, called Frederick the Great* (London, 1858–65).

FREDERICK WILLIAM II (1744–97). King of Prussia from 1786 to 1797. He was the son of Prince Augustus William of Prussia, the brother of Frederick the Great, and was born Sept 25, 1744 During his reign Prussia declined, owing to his indolence and lack of political sagacity. He gave himself up to sensuality and to the mystic vagaries of the Rosicrucians He contracted four marriages, besides making no secret of his relations with the Countess Lichtenau His good nature led him to abrogate taxes which the country could hardly spare A futile expedition into Holland, in support of the stadholders, cost him 6,000,000 thalers, and his efforts, in conjunction with Austria, to uphold royalty in France, resulted, after a war lasting from 1792 to 1795, in the cession to France, by the Treaty of Basel, of the Prussian territories west of the Rhine Frederick William II shared in the second and third partitions of Poland (1793, 1795), by which Prussia received large accessions of territory. Consult Treitschke, *Deutsche Geschichte im XIXten Jahrhundert* (Leipzig, 1878–95), Paulig, *Friedrich Wilhelm II, sein Privatleben und seine Regierung* (Frankfort on the Oder, 1896), Stanhope, *A Mystic on the Prussian Throne* (London, 1912)

FREDERICK WILLIAM III (1770–1840). King of Prussia from 1797 to 1840 He was the son of Frederick William II and was born Aug 3, 1770, at Potsdam On his accession in 1797 he dismissed the favorites of the preceding reign and entered upon a tour of inspection through the numerous provinces of his kingdom for the purpose of investigating their condition But though Frederick William was well intentioned, he lacked the force of will to cope with the difficulties of his position In the reconstitution of the German Empire after the Peace of Lunéville (1801), Prussia acquired the sees of Hildesheim, Paderborn, and Munster, as a compensation for her territories west of the Rhine wrested from her by France The repeated and systematic insults of Napoleon, who despised Frederick William while he professed to treat him as a friend, roused the spirit of the nation, and the King saw himself obliged to agree to a convention with Russia, the real object of which was to drive Napoleon out of Germany. But when Napoleon marched against Austria in 1805, Frederick William remained inactive After the battle of Austerlitz (December, 1805) he even entered into a convention with Napoleon, by which Prussia gave up Anspach, Bayreuth, Cleves, and Neuchâtel, and received more than their equivalent in Hanover, wrested by Napoleon from the English dynasty The affronts of Napoleon were redoubled after this fresh proof of Frederick William's indecision The Prussian nation, headed by the Queen, the beautiful Louisa of Mecklenburg-Strelitz, now called loudly for war, and the King yielded The Prussian army was annihilated in the battles of Jena and Auerstadt, fought on the same day (Oct 14, 1806), and the French overran the kingdom The Russian armies advanced to the aid of Prussia The indecisive battle between the allies and the French at Eylau (Feb 7, 8, 1807) was followed by the victory of Napoleon over the Russians at Friedland (June 14), which left Prussia at the mercy of the conqueror In the Treaty of Tilsit, July 9, 1807, Prussia was almost dismembered, being forced to give up her possessions west of the Elbe and the Polish dominions acquired in 1793 and 1795 During the next few years Prussia remained almost effaced as a European power, and Napoleon seized every opportunity of humbling Frederick William But during this period of humiliation the King and his people were quietly undertaking the task of regeneration Frederick William's great Minister, Stein, emancipated the serfs and inaugurated local self-government in the towns. Scharnhorst and Gneisenau reorganized the army, training in secret three times as many men as were allowed by treaty with Napoleon The disastrous termination of Napoleon's Russian campaign was the turning point in the fortunes of Prussia At the beginning of 1813 the German people rose in arms against France, Frederick William entering into an alliance with Russia Napoleon was victorious at Lutzen and Bautzen, May, 1813 Austria now took up arms against France, and the battle of Leipzig, October, 1813, achieved the liberation of Germany Prussia joined in the invasion of France, and her armies entered Paris The Congress of Vienna restored to Prussia a great part of her former possessions, and among her acquisitions were half of the Kingdom of Saxony and large territories in the Rhineland The part played by Blucher at Waterloo determined Prussia's rank among the great military powers of Europe The Prussian people, however, were doomed to disappointment in the erection of a new era of liberal government In 1815 Frederick William joined Czar Alexander I and the Emperor Francis of Austria in the formation of the Holy Alliance, the chief object of which soon showed itself to be the maintenance of absolutism The Prussian King played into the hands of Metternich, who directed the policy of the Holy Alliance Frederick William III, however, did much for the material advancement of his realm In his reign the Zollverein, or customs union, was established, which at the time of his death included the bulk of the German states, exclusive of Austria He died June 7, 1840 Consult M W Duncker, *Aus der Zeit Friedrichs der Grossen und Friedrich Wilhelm III* (Leipzig, 1876), Treitschke, *Deutsche Geschichte im XIXten Jahrhundert* (ib, 1886–95), especially vol 1, Correspondence (*Briefwechsel*) of King Frederick William III and Queen Louise with Emperor Alexander I (ib, 1900), ed by P Baillen See GERMANY; PRUSSIA, GNEISENAU, STEIN, SCHARNHORST

FREDERICK WILLIAM IV (1795–1861) King of Prussia from 1840 to 1861 He was the son of Frederick William III and was born Oct 15, 1795 He received a careful education and was fond of the society of learned men,

such as Delbruck and Ancillon He was a great lover of art and the study of antiquity He ascended the throne June 7, 1840 He exhibited much of his father's vacillation and instability of purpose, and although he began his reign by granting minor reforms and promising radical changes of a liberal character, he always, on one plea or another, evaded the fulfillment of these pledges He had high but vague ideas of "the Christian state" and showed through life a strong tendency to mystic pietism He refused to allow a constitution to come between himself and God Equally vague was his dream of a Germany united under a "college of kings" ruling by divine right A step in the direction of popular government was taken in 1847 by the convocation of the so-called "United Diet," whose activity, however, was to be merely that of an advisory body The February revolution in France in 1848 was followed by an outbreak in Prussia which shook the throne of the Hohenzollern to its foundations On March 18 the people of Berlin rose in arms. To save his crown, the King yielded to the demand for constitutional reform, although the Prussian army remained true to him, he did not want to use it against "his Berliners" In May a national Constituent Assembly met, at the same time that the Frankfort Parliament assembled to reorganize the political system of Germany On Feb 26, 1849, the new Prussian Chambers met, but the constitutional régime thus inaugurated was granted merely as the King's free gift, to be modified at his pleasure On March 28, 1849, the Frankfort Parliament offered the Imperial crown of Germany to Frederick William, but he declined it, as coming "from the gutter" (See GERMANY) In the meanwhile the King had been forced, in 1848, by the clamor of his subjects, to take up arms in support of the people of Schleswig-Holstein (q v) in their revolt against Denmark, but Prussia soon abandoned the cause of the duchies After the complete cessation of the revolutionary movement in Germany the reactionary régime was in full sway The "pietists" regained their former influence at court, and the freedom of the press and of religious and political opinion was strictly circumscribed In 1857 Frederick William was seized with intermittent attacks of insanity, and in 1858 he resigned the management of public affairs to his brother and heir, Prince William, who acted as Regent of the kingdom till his accession, on the death of Frederick William, which occurred Jan 2, 1861 Consult Biedermann, *Dreissig Jahre deutscher Geschichte* (Breslau, 1896), Meinecke, "Friedrich Wilhelm IV und Deutschland" (*Historische Zeitschrift*, vol liii, Munich, 1902), Ludwig, *Ueber Friedrich Wilhelm IV's Stellung zur preussischen Verfassungsfrage* (Breslau, 1907)

FREDERICQ, frā'de-rēk, PAUL (1850–). A Flemish historian, born at Ghent He was educated at Liége and held successively the chairs of history at Arlon, Liége, and Ghent, where he became a prominent leader of the national movement for the extension of the Flemish language, customs, and laws His numerous works, in Dutch, French, and Latin, distinguished by scholarly research and clearness of exposition, include *De Nederlanden onder Keizer Karel V* (1885), *Geschiedenis der inquisitie in de Nederlanden* (1889–1902), *Onze historische volksliederen van voor de godsdienstige beroerten der 16e eeuw* (1894), *Corpus Documentorum Inquisitionis Hæreticæ Pravitatis Neerlandicæ* (1889–1903)

FRED'ERICTON A city and port of entry, the capital of York County and of New Brunswick, Canada, on the St John River, 67 miles north-northwest of St John, and on the Canadian Pacific and the Intercolonial railroads (Map New Brunswick, C 3) The river is navigable for large vessels to this point, 84 miles from its mouth in the Bay of Fundy, small steamers go 65 to 75 miles farther up The city, built on a low point of land nearly surrounded by hills, is well laid out and has elegant public buildings, among which are the residence of the Lieutenant Governor, Parliament buildings, Government House, Legislative Library, exhibition building, Victoria Hospital, customhouse, the New Brunswick University, the provincial normal school, a collegiate and other schools Fredericton is the seat of an Anglican bishopric, and the cathedral is a handsome edifice The city is the centre of a lumbering district The manufactured products include flour, canoes, motor boats, boots and shoes, shoepacks and larrigans (tanned leather shoes and boots for lumbermen), foundry and machine-shop products, leather, lumber, and cotton The United States has a consular agent here Founded about 1740, the village was first called St Anne After New Brunswick became a British possession, Sir Guy Carleton, who in 1786 was appointed Governor-General of all the British North American provinces, in that year laid out the principal streets of St Anne to run parallel with the river, changed the name to Fredericton, and two years later it became the capital of the province It was incorporated in 1849 Pop, 1901, 7117, 1911 7208

FREDERIKSBERG, frăd'ēr-īks-bĕrg A western suburban municipality of Copenhagen, Denmark, with which it is connected by the wide Frederiksberg Allee, lined with pleasure gardens (Map Denmark, F 3) It is a handsome residential place, with the beautiful park of Sondermarken, a zoological garden, the Ny-Carlsberg Glyptothek, an art museum, and the Frederiksberg Palace, constructed in Italian style, now used as a military college The palace was built by Frederick IV in the first half of the eighteenth century, and stands in a prominent hill park commanding a fine and extensive view Near by are the Royal Porcelain Works and also a faience factory, in another adjoining territory are two great breweries Pop, 1901, 76,237, 1911, 97,237 It became a port of Greater Copenhagen during the first decade of the twentieth century

FREDERIKSBORG, frăd'ēr-īks-bôrg A Danish castle, situated on three islands of a lake of the same name, on the island of Zealand, 22 miles north-northwest of Copenhagen It was built in 1602–20 in Danish Renaissance style, by Christian IV of Denmark, on the site of an older building of Frederick II Since a fire in 1859 it has been restored as a national historical museum, with handsome rooms, notably the knights' hall and the dining hall Its church was formerly the coronation place and contains a king's oratory, with 23 Passion paintings by Bloch Its gardens are laid out in French style It has fine paintings and mural decorations by J Ovens, and sculpture by De Vries and L P. Swers

FREDERIKSHALD, frā'dēr-īks-hal' A fortified seaport of Norway, beautifully situated on

the Idefjord, where the Tistedalselv falls into it, about 85 miles south-southeast of Christiania (Map Norway, D 7) It has a Latin school It exports a considerable amount of wooden ware, and is one of the centres of the timber traffic for East Norway. The harbor is good and is guarded from an eminence by the fortress of Frederiksten and the smaller Glydenlove fort A monument marks the place where Charles XII fell in an attempt to capture the town in 1718 The town withstood a two years' siege by the Swedes (1658–60) Pop, 1900, 11,936, 1910, 11,992

FREDERIKSHAVN, frā'dēr-īks-ha'v'n A seaport town of Jutland, Denmark, situated on the Cattegat, 52 miles northeast of Aalborg (Map Denmark, D 1) It has an excellent harbor, free from ice throughout the year, with accommodation for vessels of 20-foot draft The chief imports are wood, grain, coal, iron, yarn, and cotton goods, while the exports consist of dairy products, beef, pork, fish, oysters, and eggs Regular steamship lines run to the cities of Sweden, to England, and to Copenhagen. It is one of the youngest of Danish towns, having received municipal rights in 1818. Pop, 1901, 6478, 1911, 7916

FREDERIKSTAD, frā'dēr-īk-stad A seaport of Norway, situated at the mouth of the Glommen, 58 miles southeast of Christiania (Map Norway, D 7) It is an important centre for the lumber trade with Germany, Holland, and France, the wood being rafted down the Glommen It is a very busy industrial centre, manufacturing bricks, lumber, engines, and boilers, ships, cotton and woolen goods, and chemicals It was founded in 1570 and was for a long time strongly fortified Near it is Hanko, the most fashionable of Norwegian watering places. Pop, 1900, 14,635, 1910, 15,597

FRED'MAN, THE. A name sometimes used by the Swedish poet Karl Mikael Bellman (q v).

FREDO'NIA A city and the county seat of Wilson Co, Kans, 91 miles east by south of Wichita, on the Frisco, the Atchison, Topeka, and Santa Fe, and the Missouri Pacific railroads, and on the Fall River (Map Kansas, G 8). It is the centre of an agricultural and stock-raising district and has a supply of natural gas and oil Its industrial establishments include brick and cement works, a linseed-oil mill, window-glass and ice plants, and a foundry The water works and sewage system are owned by the city Fredonia has adopted the commission form of government Pop, 1900, 1650, 1910, 3040

FREDONIA A village in Chautauqua Co, N Y, 45 miles southwest of Buffalo, on the Dunkirk, Allegheny Valley, and Pittsburgh Railroad (Map New York, A 6) It is the seat of a State normal school and has the D R. Barker Free Library The village has extensive nurseries, wine cellars, seed companies, canning establishments, and grape-juice and patent-medicine factories It is the centre and chief village of the famous grape belt of western New York The water works and electric-light plant are owned and operated by the municipality One of the oldest villages in western New York, Fredonia was settled in 1803 and incorporated in 1829 Natural gas was utilized for lighting the village as early as 1821. Pop, 1900, 4127, 1910, 5285

FREDRO, frā'drō, ALEXANDER, COUNT (1793–1876) A Polish playwright, born at Surochow, Galicia For several years he served in the army, and at the end of that time (1814) he visited Paris and there studied the French theatre Upon his return to Poland he produced 18 comedies, which were played with success He is praised for his depiction of comic types and for the entirely national spirit of his work His plays were collected and published in 1877 and again in 1880 Some of his plays have been translated into German —His son JAN ALEXANDER (1829–91), born in Lemberg, was also a dramatic author His comedies had some success, but he was far from equaling his father His works were published in 1881

FREE BENCH (*francus bancus*) An ancient form of dower existing by custom, and not by common law, in certain manors in England The right of free bench was independent of endowment and was a purely customary provision for the wife, who became entitled to it at once upon her husband's death, without waiting, as is still the case with ordinary dower, for its assignment by the heir. Coke says "This right is called *francus bancus*, to distinguish it from other dowers, for that it cometh freely, without any act of the husband's or assignment of the heir" (Co Litt 94, b) The custom varied in different manors, the widow being entitled to the whole of her husband's lands in some, while in others she received one-half or one-third only The right applied only to estates of inheritance held by the tenure of free and common socage and was usually, if not always, limited to the period of widowhood and the good behavior of the wife (*dum sola et casta vixerit*). See DOWER

FREE CHURCH OF ENGLAND. See REFORMED EPISCOPAL CHURCH

FREE CHURCH OF SCOTLAND. See PRESBYTERIANISM

FREE CITIES (Ger *Freistadte*). The name given to the three German cities of Hamburg, Bremen, and Lubeck, which are sovereign states and members of the German Empire Since the middle of the fourteenth century the term "free cities" has been used for certain German towns, but not always with the same meaning The designation was applied 1 To cities in the Rhine valley (Cologne, Mainz, Worms, Speier, Strassburg, Basel) and elsewhere which had been under the control of bishops, but had become almost independent in the course of the thirteenth and fourteenth centuries They enjoyed even greater freedom than the so-called "Imperial" cities All of these cities have become parts of the larger political divisions 2 To the Hanse cities—Frankfort on the Main, Hamburg, Bremen, and Lübeck These cities were wealthy and became centres of active popular life and of free institutions in the thirteenth, fourteenth, and fifteenth centuries They maintained their freedom until the time of the Napoleonic wars By the Congress of Vienna, in 1815, they were restored to their former rights as free cities Hamburg, Lubeck, and Bremen still retain their privileges under the reconstituted German Empire, but Frankfort was annexed to Prussia in 1866 Consult Arnold, *Verfassungsgeschichte der deutschen Freistadte* (Gotha, 1854), and Hullmann, *Stadte wesen des Mittelalters* (Bonn, 1826–29)

FREE CONGREGATIONS (Ger *freie Gemeinden*). An association of German rationalists It originated in Saxony in 1841, where

the members were called "Protestant Friends" and "Friends of Light" The immediate occasion was an attempt to discipline a Magdeburg preacher who had expressed heretical views Early leaders in the movement were Leberecht Uhlich (q v) and Gustav Adolf Wislicenus (q v), both of whom were forced out of the Evangelical church for expressing liberal views In like manner independent congregations arose in a number of places, and in 1847 a union was effected between them on the basis of a simple profession of faith in God By this time their gatherings, held symbolically in the open air, had come to number more than 2000, including delegates from England and America In 1850 they were united with the German Catholics (q v), and in the same year and the years immediately following some 40 congregations were established in the United States, but had a short existence After the revolutionary movements of the middle of the century several of the German governments undertook to suppress them, partly for political reasons Many congregations were broken up Those still in existence in 1859, about 50 in number, under Uhlich's leadership, formed a "Union of Free Congregations in Germany," upon a highly rationalistic basis Inasmuch as the fullest individual liberty is allowed, the belief of members and congregations varies greatly There has been a tendency towards radical free thought, and some even deny the existence of a personal deity At present there are about 22,000 members in the entire association Consult Kampe, *Geschichte der religiosen Bewegung der neuern Zeit* (Leipzig, 1852–60), and *Freidenker-Almanach* (Gotha, annually)

FREEDEN, frā'den, WILHELM IHNO ADOLF VON (1822–94) A German mathematician and expert on navigation, born at Norden, Hanover, and educated at Bonn and Gottingen He was director of the school of navigation at Elsfleth, Oldenburg, and later became established at Hamburg, where, in 1867, he founded the German Naval Observatory, which he conducted until 1875 The purpose of this institution is to promote and facilitate maritime intercourse It comprises the department of maritime meteorology, a bureau of nautical, meteorological, and magnetic instruments, the department of coast meteorology and signal service, and a bureau for testing chronometers Freeden, who was a member of the Reichstag from 1871 to 1876, founded, with H Tecklenborg-Bremen, the publication entitled *Hansa, Zeitschrift fur Seewesen,* which he edited until 1891

FREEDMAN See FREEMAN AND FREEDMAN

FREED'MAN'S BUREAU A "Bureau of Refugees, Freedmen, and Abandoned Lands," established in the War Department of the United States by the Statute of March 3, 1865 This act provided that the bureau was to be maintained through the war and for one year thereafter, and that it should have "the supervision and management of all abandoned lands, and the control of all subjects relating to refugees and freedmen," under "such rules and regulations as may be presented by the head of the bureau and approved by the President" Especially important was the provision authorizing the President to appropriate for the use of freedmen the confiscated and abandoned lands within the Southern States, not more than 40 acres for a period not longer than three years being assigned to each man thus aided Provisions, fuel, and clothing were, moreover, to be distributed free of charge by the bureau to destitute freedmen and loyal refugees "The bureau assumed, in short, a general guardianship of the emancipated race, and, backed by the paramount military force of the United States, undertook to play a determining rôle in the process of reorganizing Southern society" The administration of the bureau was placed in the hands of a chief commissioner and his deputies, and in the actual application of the statute much was done with reference to labor, clothing, fuel, provisions, and schools for the beneficiaries of the plan A second Freedmen's Bureau bill was passed by Congress, Feb 6, 1866, but was vetoed by President Johnson and was not passed over his veto Later, however, there was passed over the President's veto the Act of July 16, 1866, which extended for two years the term of the bureau's statutory life, increased its powers, authorized the sale for educational purposes of Confederate public property, and gave to the bureau military jurisdiction over infringements of civil rights secured by the act In June, 1868, another bill was passed, extending the term of the bureau for one year in unreconstructed States The bureau's chief work ended on Jan 1, 1869, and its educational work was concluded a year and a half thereafter More than $15,000,000 was spent by the bureau, and, in addition to the general relief afforded, it aided appreciably in the movement for the higher education of the freedmen which resulted in the founding of such institutions as Atlanta University, Fisk University, and Howard University, the last being named after the chief figure in this work, the commissioner of the bureau, Gen Oliver O Howard (q v) Widely differing opinions have been, and are, held with regard to the methods used and the results attained by the bureau—some writers maintaining that its work was almost wholly beneficent, others that on the whole much more harm was done than good However useful and beneficent an institution it may have been, it was cordially detested by the greater part of the white people of the South who saw in the bureau only a diabolical device for perpetuating the national government's control over the South and for the humiliation of the whites before their former slaves The text of the first Freedmen's Bureau bill may be found in 13 *Statutes at Large* (Thirty-eighth Congress), that of the second in 13 *Statutes at Large* (Thirty-ninth Congress) For an account of the bureau's work, consult General Howard's report for 1869, published among the executive documents of the House of Representatives, Forty-first Congress, second session Also consult "The Freedmen's Bureau," in *Atlantic Monthly,* vol lxxxvii (Boston, 1901), and Peirce, *The Freedmen's Bureau* (Iowa City, 1904)

FREE'DOM A borough in Beaver Co, Pa., 25 miles northwest of Pittsburgh, on the Pittsburgh, Fort Wayne, and Chicago Railroad, and on the Ohio River (Map Pennsylvania, A 6) The chief industries are the manufacture of oil, caskets, and monuments Pop, 1900, 1783, 1910, 3060

FREE'DOM OF THE CITY The custom, prevalent both in American and European cities, of conferring on a distinguished visitor the privileges connected with municipal citizenship The names of such honorary citizens or burgesses are entered upon the register of munici-

pal electors, but they are not entitled, when nonresidents, or not engaged in business in the particular city or town, to exercise the municipal franchise or to be admitted to membership in the governing bodies The practice of conferring the freedom of the city, which at present amounts to little more than an expression of esteem on the part of the public magistrates, may be traced back to mediæval times, when the principle of freedom of domicile was by no means universally recognized, and cities partook almost entirely of the nature of private corporations, admission into which was hampered by many restrictions The most usual way of obtaining the privileges of citizenship at that time was by a long term of apprenticeship (seven years as a rule) to one of the recognized guilds, followed by an examination in the principles of the craft, and, where the candidate was successful, enrollment in the ranks of master workmen In view of so cumbrous a process the presentation of the freedom of the city by a special vote of the magistrates was, in fact, a substantial favor and was granted only in cases where great wealth or renowned citizenship made a man a desirable accession to the list of burghers See GUILDS

FREEDOM OF THE PRESS See PRESS, FREEDOM OF THE

FREE FUGUE. See FUGUE

FREE GIFT See BENEVOLENCE

FREE'HOLD A town and the county seat of Monmouth Co, N J, 33 miles by rail east of Trenton, on the Pennsylvania and the Central of New Jersey railroads (Map New Jersey, D 3) It has a Carnegie library, two military schools, and a park in which is a fine granite monument, 100 feet high, commemorating the battle of Monmouth (q v) The town is commercially important as a distributing centre for a farming district and has a large canning factory and manufactories of carpets and rugs, foundry and machine-shop products, and rasps Freehold was settled about 1735, when county courts first began to be held here, and for many years was known as Monmouth Court House It was incorporated in 1869 and has adopted the commission form of government The water works and sewage system are owned and operated by the town Pop, 1900, 2934, 1910, 3233

FREEHOLD (Lat *liberum tenementum*, free holding or tenement) In the classification of estates in land, any estate of inheritance or for life, held by a free tenure It is distinguished from the copyhold (q v) and from the leasehold (q v) As thus employed, it is a mere term of classification, but in its origin it was coextensive in meaning with the term "fee," as signifying lands held of some lord by feudal tenure (See FEE, TENURE) The original freehold or fee was the life estate, and the term "freehold" has always been employed by law writers from Littleton down in a special and technical sense, as signifying an estate for life But its more common use, especially in American law, is as above indicated Under the feudal system a free holding or freehold was such a tenement as a free vassal might properly hold The tenure might be military or nonmilitary, and the estate might be corporeal or incorporeal, but the holding must be for life at least, and not for a definite term of years, nor, as in the case of copyhold, at the will of the lord of whom the land was held For a description of the various forms of freehold, see FEE SIMPLE, FEE TAIL, LIFE ESTATE See also ESTATE, FEUDALISM

FREEHOLD, CUSTOMARY See CUSTOMARY FREEHOLD

FREE LANCE (Ger *freier Landsknecht*, free land trooper, in distinction from the Swiss mountaineers, but confused with *Lanzknecht*, lance trooper) In the later Middle Ages and early modern times, one of the roving companies of knights and men at arms who wandered from state to state, selling their services to any lord who was willing to purchase their aid They played their most prominent part in Italy, where they were known as condottieri (q v) See BRABANÇONS

FREE'LAND A borough in Luzerne Co, Pa, 18 miles (direct) south of Wilkes-Barre on the Lehigh Valley Railroad (Map Pennsylvania, K 4) The borough contains the Mining and Mechanical Institute, Girls Industrial School, and the Hill Observatory It is in a coal-mining and agricultural region and has a foundry and machine shops, a brewery, hames and overall factories, and a silk mill Pop, 1900, 5254, 1910, 6197

FREE LIBRARIES See LIBRARIES

FREE'MAN A town in Hutchinson Co, S Dak, 45 miles southwest of Sioux Falls, on the Chicago, Milwaukee, and St Paul Railroad (Map South Dakota, G 4) It is in a purely agricultural region and contains the South Dakota Mennonite College and a fine city hall The water works are owned by the town Pop, 1900, 525, 1910, 615

FREEMAN, ALICE ELVIRA See PALMER, ALICE (FREEMAN)

FREEMAN, EDWARD AUGUSTUS (1823–92) An English historian He was born at Mitchley Abbey, Harborne, Staffordshire, Aug 2, 1823, and at an early age was left an orphan Under the care of his paternal grandmother he received education in various private schools and after a course of private tuition received a scholarship at Trinity College, Oxford, in 1841 In 1845 he graduated and the same year was elected fellow of his college In 1847 he married Miss Eleanor Gutch, daughter of his former private tutor The following year, with an accession to his private fortune, he retired to Dursley, Gloucestershire, and applied himself to a life of historical study and research With a special predilection for ecclesiastical architecture, in 1849 he published *A History of Architecture* He contributed articles and reviews to the *Guardian*, the *Saturday Review*, and other periodicals, and also published pamphlets, all noted for their scholarship, accuracy, and correction of popular errors, which kept his name prominently before the reading public In 1857 and 1858 he was appointed examiner in the School of Law and Modern History at Oxford, a position he again held in 1863, 1864, and in 1873 In 1860 he had removed to Somerleaze, near Wells, Somerset, where for some years he acted as county magistrate, and, with political aspirations as a Gladstonian Liberal, in 1868 unsuccessfully stood as member of Parliament for Mid-Somerset In 1863 appeared the first volume of his *History of Federal Government from the Foundation of the Achaian League to the Disruption of the United States* (a work that he left unfinished), in 1867 was published the first volume of his *History of the Norman Conquest* (6 vols, 1867–79), which established his position among Eng-

lish historians. He was created D C L of Oxford in 1870, in 1874 received the honorary degree of LL D from Cambridge, and in 1880 was elected honorary fellow of his college at Oxford For the better elucidation of his subjects he traveled extensively, visiting the places connected with the histories he was writing In the winter of 1881–82 he visited the United States on a lecturing tour, which resulted in the publication of *Introduction to American Institutional History* (1882), *Lectures to American Audiences* (1882), and *Some Impressions of the United States* (1883) He succeeded Bishop Stubbs of Chester as regius professor of modern history at Oxford in 1884, and the same year was created honorary LL D of Edinburgh University From 1886 to 1890 failing health impelled him to spend the winters of each year in Sicily, where he wrote his *History of Sicily* (4 vols, 1891–94) While traveling in Spain he died of smallpox at Alicante, March 16, 1892 Freeman was the leader of the Teutonic school of English history and a voluminous writer His principal work, *The History of the Norman Conquest*, in impartial, exhaustive treatment and unimpeachable accuracy, is one of the greatest monuments of historical research It is as a political historian that he is best known Among his writings not already mentioned are *History and Conquest of the Saracens* (1856), *Comparative Politics* (1873–96), *Growth of the English Constitution* (1876), *The Ottoman Power in Europe* (1877), *Historical Geography of Europe* (1881), *English Towns and Districts* (1883), *The Reign of William Rufus* (2 vols, 1882), *Western Europe in the Fifth Century An Aftermath* (1904), *Western Europe in the Eighth Century* (1905) Consult Stephens, *Life and Letters of Edward Augustus Freeman* (2 vols, London, 1895), and Bryce, *Studies in Contemporary Biography* (New York, 1903)

FREEMAN, JAMES (1759–1835) An American Unitarian clergyman He was born in Charlestown, Mass, graduated at Harvard in 1777, and in 1782 became a reader in King's Chapel, Boston Soon he became a Unitarian, and in 1785 the people of his church altered their prayer-book in accordance with his views and became the first Unitarian church in the United States He was ordained (1787) by his own congregation, since the Bishop refused to ordain him, and remained rector of King's Chapel for 39 years In 1811 he received the degree of D D. from the University of Cambridge He was a scholarly and philanthropic man and was one of the founders of the Massachusetts Historical Society Consult a sketch of him in that Society's *Collections*, 3d series, vol v (Boston, 1836)

FREEMAN, JAMES MIDWINTER (1827–1900) An American clergyman and writer He was born in New York City and was educated at Wesleyan University and at Mount Union College (Ohio) He entered the Methodist ministry and in 1872 became assistant editor of various Sunday-school and tract publications of the Methodist Episcopal church Under the pseudonym of "Robin Ranger," Freeman wrote several books for children His other works include *Use of Illustration in Sunday School Teaching* (1867); *Handbook of Bible Manners and Customs* (1874); *A Story History of the English Bible* (1879)

FREEMAN, JOHN RIPLEY (1855–). An American civil and mechanical engineer, born at West Bridgton, Me Graduating from Massachusetts Institute of Technology in 1876, he was an assistant engineer for 10 years chief engineer of the Associated Factory Mutual Insurance Company in 1886–96, and after 1886 also consulting engineer on water supply and mill construction for various large corporations, and on water supply for numerous cities, among them New York, Boston, Los Angeles, Baltimore, and San Francisco His advice was sought also in connection with the Panama Canal locks and dams, and by the Canadian government on waterpower conservation In 1902–03 he was vice president of the American Society of Civil Engineers, whose medal he twice received for the best yearly contribution to its *Transactions*, and in 1904 he served as president of the American Society of Mechanical Engineers

FREEMAN, MARY E WILKINS See WILKINS

FREE'MAN, MRS The name assumed in jest by Sarah Jennings, wife of John Churchill, Duke of Marlborough, during her friendship and correspondence with Queen Anne The name was adopted shortly after the beginning of the acquaintance in 1683 Queen Anne adopted that of Mrs Morley

FREEMAN, NATHANIEL (1741–1827) An American physician and jurist, born at Dennis (Barnstable County), Mass He settled at Sandwich (also in Barnstable County) in 1763 He studied both medicine and law, served in the American army during the Revolution, commanding a militia regiment in the Rhode Island expedition, and from 1781 to 1791 was brigadier general of militia From 1795 to 1799 he was a member of Congress He was also in the State Legislature of Massachusetts, and long a judge of probate and of the Court of Common Pleas

FREEMAN, SUSANNA See CENTLIVRE, SUSANNA

FREEMAN AND FREEDMAN. In the most general acceptance of these terms, the first implies one who has inherited the full privileges and immunities of citizenship, the second, one who has been delivered from the restraints of bondage, but who, usually, is not placed in a position of full social or even political equality with him who was born free With the Romans the equivalent for freeman (*liber homo*) comprehended all classes of those who were not slaves, but the distinction was preserved by the application of the term *ingenuus* to him who was born free, and of *libertinus* to him who, being born in servitude, was emancipated As the organization of Roman society survived the convulsions of the Middle Ages to a far greater extent in the towns than in the rural districts, where the institutions of feudality almost entirely superseded it, it is in the borough and other municipal corporations of continental Europe that *freemen* still were found comprising persons inheriting or acquiring by adoption, purchase, or apprenticeship the rights of citizenship The idea of a freeman was by no means peculiar to the Roman or Romanized population of Europe, on the contrary, it belonged to the constitution of society in all the Indo-Germanic nations Among those branches of them commonly known as Teutonic, it was generally based on the possession of some portion of the soil Thus, in Anglo-Saxon England "the freeman was strictly the freeholder, and the exercise of his full rights as a free member of the community to which he belonged became

inseparable from the possession of his holding in it" Consult Green, *The Making of England* (London, 1882), and Crumley, *On the Social Standing of Freedmen as Indicated in the Latin Writers*, part 1 (Baltimore, 1906) See ANGLO-SAXONS, CITIZEN, SLAVERY

FREE'MA'SONRY. A modern name of popular usage designating the principles of the Order of Freemasons Formerly the word *Masonry* alone was employed and it is still used in the writings, history, and ritual of the craft The term "Freemasonry" seems to have risen from the fact that only *free* men were eligible to the order, and that they were required to be elected with practical unanimity The members then denoted themselves "Free and Accepted Masons", but the public curtailed this to Freemasons and the order to Freemasonry See MASON, FREE

FREE METHODISTS See METHODISM

FREE PORT (Ital *porto franco*) A harbor where the ships of all nations may enter on paying a moderate and uniform toll and load and unload Free ports form depots where goods are stored at first without paying duty, these goods may then be either reshipped for export on paying a mere transit duty, or they may pay the usual full customs of the country and be admitted for home consumption Free ports thus facilitate transit trade and form, as it were, a foreign district within a state See WAREHOUSING SYSTEM

FREE'PORT A city and the county seat of Stephenson Co, Ill, 113 miles by rail west by north of Chicago, on the Pecatonica River, and on the Chicago and Northwestern, the Illinois Central, the Chicago Great Western, and the Chicago, Milwaukee, and St Paul railroads (Map Illinois, E 1) It contains the St Vincent's Orphanage and a public library There are railroad shops and manufactories of organs, wagons, buggies, bicycles, windmills, novelties, gasoline engines, and paints Freeport was settled in 1835 and chartered in 1885 The government is administered by a mayor and a unicameral council Pop, 1900, 13,258, 1910, 17,567, 1914 (U S est), 19,018, 1920, 19,669 Here in 1858 occurred the debate between Lincoln and Douglas in which Douglas enunciated his famous "Freeport heresy" or "doctrine," which was to the effect that, in spite of the Dred Scott case (q v), any Territory might virtually exclude the slave system by passing "unfriendly" police laws incompatible with its existence This doctrine alienated many of Douglas's former supporters and greatly weakened him in the presidential campaign of 1860

FREE'PORT A village on Long Island, in Nassau Co, N Y, 20 miles east of New York City, on the Long Island Railroad (Map New York, B 3) It is essentially a residential place and contains a high school and two large clubhouses Fishing is carried on to some extent The water works and electric-light plant are owned by the village Pop, 1900, 2612; 1910, 4836

FREER, CHARLES LANG (1856–1919) An American capitalist He was born at Kingston, N Y, and was educated in the public schools Until his retirement he was engaged in railroad and manufacturing enterprises at Detroit, Mich He made a large art collection, which he presented to the Smithsonian Institution at Washington, D C The University of Michigan conferred on him the honorary degree of A M

FREE SCHOOLS See COMMON SCHOOLS

FREE SHIP. See ARMED NEUTRALITY, THE, DECLARATION OF PARIS.

FREE'SIA A genus of bulbous plants of the family Iridaceæ, comprising two species, natives of the Cape of Good Hope, which during the closing quarter of the nineteenth century became widely popular as greenhouse and window-garden plants for winter blooming The leaves are long and grasslike, the long scape, bent at an angle, bears at the top five or six pale-yellowish or white erect tubular flowers of exquisite fragrance Perhaps *Freesia* is the easiest and most satisfactory bulbous plant to grow, since it requires even less attention as to soil and watering than the hyacinth, and unless kept too dry, or watered too heavily, will produce flowers without forcing in from six to eight weeks The principal producing centres of freesias are the Channel Islands, California, and Bermuda, where the finest bulbs are said to grow For illustration, see Colored Plate of IRIS

FREE-SOIL PARTY, THE The name of a political party in the United States, which was formed in 1848 and became merged in the Republican party in 1856 The activity of the Abolitionists (q v) throughout the decade of the thirties, the energetic though indirect championing of the equal rights of all men by conservative leaders, such as John Quincy Adams, and the controversy over the extension of slavery in connection with the admission of Texas, brought the question of the further extension or the restriction of slavery once more into the foreground in 1844, although both of the existing parties, Democrats and Whigs, virtually refused to recognize the existence of any such question Within the Northern wing of each party there arose, therefore, groups of workers, such as that led by S P Chase in Ohio, who aimed to commit their party to the principle of opposition to the further extension of slavery in the national Territories The issue was forced by the introduction, in the House of Representatives, of the so-called "Wilmot Proviso" (q v) in 1846 by David Wilmot, a Democratic member from Pennsylvania, as an amendment to a bill in Congress making an appropriation to negotiate peace with Mexico The proviso passed the House, but failed in the Senate Particularly in Massachusetts was a vigorous effort made to make the Whig party a free-soil party, and the bitter contest between the "Conscience" Whigs and the "Cotton" Whigs enforced upon the former the fact that for them there was no place within their old party, and that, in order to establish their principle, they must found a party whose dominant purpose should be opposition to slavery extension The necessity for this was still further emphasized by the refusal of both national conventions of 1848 to indorse the principle of the Wilmot Proviso, and so in August of 1848 there met at Buffalo the first national convention which stood for this principle, and which comprised in its membership the "Barnburner" Democrats of New York, who had bolted their national convention, members of the former Liberty party (q v) under the leadership of Chase, and the "Conscience" Whigs of Massachusetts, led by Charles Francis Adams and Charles Sumner By this convention Van Buren and Adams were named as the national ticket, and resolutions were adopted which concluded "That we inscribe on our banner 'Free

Soil, Free Speech, Free Labor, and Free Men,' and under it will fight on and fight ever, until a triumphant victory shall reward our exertions" Although the ticket received no electoral vote, and only 291,263 popular votes (sufficient to turn the scale in favor of Zachary Taylor as against Lewis Cass), the party secured such local advantages that it was able to send Chase to the Senate in 1849 and Sumner in 1851 On the other hand, the alliance with the "Barnburners" was temporary, and so hopeless was the outlook that Chase formally joined the Democrats in the State elections in Ohio in 1851 In 1852 the Free-Soil candidate, John P Hale of New Hampshire, received only 156,149 votes In that year many Northerners were reconciled to their original parties by the "finality" planks and by the hope of thus preventing further discussion of slavery extension When this hope proved ill founded, by the Kansas-Nebraska struggle, old party lines were broken, and the principles of the Free-Soil party were largely adopted by the new Republican party Consult J C Smith, *Liberty and Free Soil Parties in the Northwest* (New York, 1897), Curtis, *The Republican Party*, vol 1 (ib, 1904), T H McKee, *National Conventions and Platforms of All Political Parties, 1789–1905* (6th ed, Baltimore, 1906), and see LIBERTY PARTY, REPUBLICAN PARTY

FREE SONS OF ISRAEL, INDEPENDENT ORDER OF A Jewish fraternal and benevolent society, with headquarters in New York City, founded on Jan 10, 1849 It has three grand lodges and 89 subordinate lodges, distributed throughout the United States Up to 1914 it had paid to widows and other beneficiaries $6,559,355, and at that date had 8745 members

FREE'STONE. A name given to those sandstones which have a homogeneous texture and can be cut readily in all directions so as to be easily reduced to any form required for architectural uses It occurs in rather thick beds, without minor division planes or directions of cleavage The name is sometimes applied also to limestones that have similar physical characters See SANDSTONE, BUILDING STONE

FREE THEATRE. See THÉÂTRE LIBRE

FREE'THINK'ER One who rejects authority, particularly that of ecclesiastical tradition, in the formation of his religious opinions The term came into common use early in the eighteenth century, after the publication of Anthony Collins's *Discourse of Freethinking, occasioned by the Rise and Growth of a Sect called Freethinkers* (London, 1713), and was applied particularly to the English Deists (See DEISM) It has been used to designate rationalists, infidels, or skeptics Consult J M Robertson, *A Short History of Freethought, Ancient and Modern* (2d ed, 2 vols, London, 1906), and J B Bury, *A History of Freedom of Thought* (ib, 1913) See ESPRITS FORTS

FREE'TOWN. The capital of the British West African Colony of Sierra Leone, situated on the left bank of the Sierra Leone River, about 5 miles from the coast and 33 miles by rail from Songotown (Map· Africa, C 4) It lies on low ground and is separated from the interior by a mountain chain It is the headquarters of the British forces in West Africa and a second-class imperial coaling station It has a fine harbor protected by several batteries of heavy modern ordnance There are a cathedral, a governor's palace, a Supreme Court, a technical school, and Fourah Bay College, an excellent institution affiliated with the University of Durham Freetown is the greatest seaport in West Africa, and has a considerable export trade in India rubber, palm oil, gums, nuts, and ginger, gold and silver ornaments and filigree work are skillfully made by native experts Freetown was formerly so unhealthful that it was called "the white man's grave," but since the neighboring marshes have been drained or filled in the health of the town has notably improved Pop., 1901, 34,463, 1911, 34,090, including only about 500 Europeans

FREE TRADE As first used in English literature, the term "free trade" designated trade open to all merchants, as distinguished from that monopolized by chartered trading companies In course of time restrictions other than monopolies attracted attention, and the term was extended to cover trade unhampered by any sort of governmental regulation It was even used by some writers in a sense practically synonymous with "free competition" During the eighteenth century customs duties became the favorite mode of trade restriction, and "free trade" became trade carried on in defiance of customs regulations The free traders of this period were the class we now call smugglers At present "free trade" designates trade that is either entirely unrestricted or restricted only in ways that afford no protection (q v) to home industries The former exists only in the imagination of economists, as no government has ever attempted to put it in practice The latter, on the other hand, is actually realized in the policy of the United Kingdom It is to it, rather than to absolutely free trade, that the present article refers

Although advocates of freedom of trade were not lacking in Europe before the eighteenth century (e g, De la Croix, in France, in 1623, and Nicholas Barbon, in England, in 1696), it was not until then that any considerable number of persons of influence declared themselves for such a policy The honor of having led in the crusade against the restrictions of the mercantile system, which was begun about 1750, belongs to the group of French writers called Physiocrats (q v) By them free trade was for the first time presented as an essential principle of a well-rounded system of economics The formula, *laissez-faire, laissez-passer,* first popularized by the liberal Protectionist Gournay (q v), was adopted by the Physiocrats and given an absolute character as a universal rule of state policy Turgot, Finance Minister of Louis XVI in 1774, attempted to realize some part of the programme of the Physiocrats by abolishing many of the internal restrictions upon trade, notably in the corn trade

At the same time that the Physiocrats were formulating their doctrine in France (1752–63), Adam Smith was proving to his students at the University of Glasgow that the restrictions on trade, which were universal in Europe at this period, were obstacles rather than aids to a country's industrial progress, and that freedom of trade was the policy best adapted to promote the general interest The distinguishing merit of his famous *Wealth of Nations,* regarded as a contribution to the literature of free trade, was that it showed exhaustively the evil results due to each kind of trade restriction advocated by the Mercantilists To this part of his task Adam Smith devoted six of the nine chapters

of his fourth book, and his treatment of "protective import duties," of "drawbacks," of "bounties," of "treaties of commerce," and of "colonial restrictions" was so convincing that it did even more than the positive arguments in favor of free trade, contained in other parts of his work, to discredit the policy of trade restriction, which in 1776 still commanded the support of nearly all classes But changes were at work, even as Adam Smith wrote, which were destined to convert many of the very merchants and manufacturers of whom Adam Smith despaired to the doctrine which he advocated

The first prominent statesman to show the influence of Adam Smith's teaching was William Pitt the Younger To him is ascribed the clause in the Act of Union with Ireland (1800) providing for complete freedom of trade between the two countries after 1820 Although this provision was not carried out, free-trade opinion had made such progress by the latter year that the merchants of London, headed by Thomas Tooke, presented a petition to Parliament in favor of revising the tariff in the direction of freer trade An important factor in bringing about this result was the corn-law controversy carried on between the well-known economists Malthus and Ricardo in 1814–15, and the publication in 1817 of the latter's *Principles of Political Economy* Ricardo put the theoretical argument in favor of free trade in a clearer and more convincing form than had Adam Smith Furthermore, he enjoyed the advantage of being known as a practical and very successful man of business rather than as a mere closet philosopher

Official recognition of the growing influence of free-trade sentiment was accorded in 1823 by the appointment of William Huskisson to the presidency of the Board of Trade Through his initiation Parliament passed several important statutes from 1823 to 1828 mitigating the severity of the navigation acts, reducing the number of dutiable articles, and scaling down the rates on those which continued to be taxed The reform of Parliament in 1832, and of the Poor Law in 1834, diverted attention temporarily from the tariff question, but a crop failure in 1836 again brought the corn duties prominently to the front Early in 1837 an Anti-Corn Law Association was formed in London by men prominent in public life The following year a similar association was organized in Manchester, and in 1839 these associations, and others which had been formed in different parts of England, were fused into the National Anti-Corn Law League From that year until 1846, when the repeal of the Corn Laws was definitely entered upon, agitation for free trade was carried on continuously, and with ever-increasing enthusiasm and confidence The leaders in the movement were Richard Cobden and John Bright, representatives of the manufacturing interests of Manchester It was this circumstance which gave rise to the custom, still common in Germany, of applying the designation "Manchester School" to the English advocates of free trade, who are credited with more extreme *laissez-faire* views of government than even Cobden and Bright really entertained See BRIGHT, JOHN, COBDEN, RICHARD, CORN LAWS

In truth, there was good ground for opposition to the policy of protection as practiced by England prior to 1846, quite aside from the general question of the advantages of free trade The most galling of the protective duties were on the food materials which entered into the everyday consumption of the English laborer Under the English land system the high prices for agricultural products which resulted from the grain duties redounded almost entirely to the benefit of the landholding aristocracy The laboring masses had to pay more for bread than was paid in neighboring countries in order that the landholding class might enjoy high rents Meantime manufacturers had to pay wages adjusted to the high cost of living and see themselves outstripped in foreign markets by the rival manufacturers of other countries who bore no such burden It was hard to make such a policy seem either wise or just in a country which was coming to depend more and more for its prosperity upon the success of its manufacturing industries In fact, the system was doomed from the time that the Reform Act of 1832 gave representation in Parliament to the manufacturing towns of the north, and the country needed only a clear demonstration of the way in which the grain duties actually worked to induce it to demand their abolition This demonstration was given in 1845, when the potato famine in Ireland cut off one important article of diet, and the grain duties were seen to stand like a dead wall between the starving masses of Great Britain and the abundant food supplies to be had from the Continent At this crisis Sir Robert Peel, who had long acknowledged free trade to be the goal towards which the policies of all countries should be directed, refused to stand out longer against the demands for repeal He was unable to carry his colleagues in the ministry with him, but was soon recalled to form a new cabinet, under which, after a long fight, the obnoxious duties were reduced and their ultimate abolition was brought about by the Act of Parliament of June 26, 1846 The present policy of complete nonprotection was introduced in 1869

The following table indicates the progress in the reduction and simplification of the British tariff made from 1787 to 1876

YEAR	Principal articles dutiable	Minor articles dutiable	Total articles dutiable
1787	290	1135	1425
1826	432	848	1280
1841	564	488	1052
1849	233	282	515
1855	153	261	414
1861	19	123	142
1876	10	32	42

In June, 1914, there were 12 distinct articles on the dutiable list, viz, cocoa, coffee, chicory, dried fruit, molasses, sugar, tea, tobacco, wine, beer, glucose, and spirits

The present policy of England realizes the free-trade ideal of imposing no duties that can tend to protect or encourage home industries by means of the following expedients

1 Most of the dutiable goods (e g., coffee, tea, cocoa, wine, etc) are such as cannot, for climatic reasons, be profitably produced in England

2 The duties on tobacco, a commodity which might be produced in England, are rendered nonprotective by the simple prohibition of such production in the United Kingdom This policy

dates from the reign of Charles II and has become so familiar as to involve little or no hardship

3 The duties on goods like beer, spirits, etc, which are produced in England, are exactly offset by internal-revenue duties which place the home producer in the same position, so far as taxation is concerned, as the foreign producer The practice of storing such goods, whether produced at home or imported, in bonded warehouses, makes the administration of this policy easy The only exceptions to the general principle that no favor shall be shown to home as distinct from foreign producers are in connection with ship subsidies for the benefit of the merchant marine, and certain slaughterhouse regulations which put foreign producers of live stock at a disadvantage The former is defended as a necessary feature of the postal system, and the latter on sanitary grounds

Extended attention has been given in this article to the free-trade policy of England, because it is the only important industrial nation to follow such a system Its example is followed by British India, Hongkong, and the Straits Settlements On the continent of Europe, Holland and Belgium have tariffs that are only slightly protective All other European countries and all other countries outside of Europe, however, are committed to the policy of protection It is thus not far from the truth to characterize free trade as the British policy, in distinction from protection, which is the policy of the rest of the world

In presenting the arguments in favor of freedom of trade, we will begin with the advantages claimed for this policy and conclude with the disadvantages attributed to the opposite policy, protection

As Adam Smith long ago pointed out, a principal cause of the industrial progress of the world is the division of labor and the specialization and organization which accompany it Many men, each working at a special task and sharing his products with his fellows, can produce vastly more in a given time than the same number, each trying to produce for himself all the things that he requires But one condition of the division of labor is opportunity to exchange one's special products for the needed products of others *Free exchange* thus gives the widest extension to the division of labor Obstacles to free exchange prevent the would-be specialist from giving all of his time to the occupation for which he is best fitted, because they prevent him from disposing of his products advantageously and compel him to produce a variety of things for himself or else go without them When such obstacles are natural—as barriers to the transportation of goods from one mountain valley to another—the situation is unfortunate, but perhaps irremediable When they are artificial—as are the octroi duties which prevent the free exchange of the products of town and country in certain European countries—they should be condemned. But the same reasons that make a free exchange of goods within a country advantageous make freedom of trade between nations desirable Political boundaries do not alter the essential nature of exchanges, nor the benefits that accrue to society from having them as free as possible Foreign trade, like domestic trade, is at bottom an exchange of goods for goods, in which less-desired commodities are given for more-desired commodities, to the mutual advantage of both parties to the transaction As different individuals are unequally fitted to carry on different pursuits, and gain an advantage by an arrangement which allows each to follow his bent, so different countries are unequally adapted for different industries Freedom of trade, which permits the capital and labor of each country to find employment in those industries for which it is best fitted, serves to increase the aggregate output of goods in the same way that free exchange does in the case of individuals From it there results a "territorial division of labor," by which each part of the world is devoted to those industries for which nature has adapted it, and through which the aggregate productiveness of the world's labor and capital is immensely increased The chief purpose of foreign trade is to enable the world to benefit from this territorial division of labor—to permit, e g, a country like Brazil to produce coffee, not merely for its own inhabitants, but for the world, a country like Cuba to produce sugar, a country like Italy to produce olives, fruits, and silk, a country like the United States to produce corn, wheat, and the important metals The greater the freedom of trade between countries, the greater the inducement which is held out to each to use its labor and capital in the ways calculated to contribute most to the world's wealth

In spite of the above advantages of freedom of trade, modern countries persist in maintaining their protective systems Advocates of free trade condemn protective duties on several grounds Their tendency, it is urged, is to divert labor and capital from unprotected industries, where they must otherwise find investment, to the protected industry But this must mean curtailed production If it was desirable to invest in the protected industry, business men would have done so without any encouragement That they needed encouragement is proof positive that the favored industry can only be carried on at a national loss The protective duty cannot cause labor and capital to spring up out of the ground All it can do is to influence the use to which the available supplies of labor and capital are put These supplies set a limit to the amount of industry that can be carried on If diverted from industries not needing protection to those requiring it, the available labor and capital must produce less in the aggregate The policy involves, therefore, a national sacrifice Unless good reasons for such a sacrifice are advanced, protection must stand condemned Of course protectionists have reasons for their policy which they consider good, but to advocates of free trade they seem inadequate.

Other arguments against a protectionist policy, and therefore in favor of free trade, are beginning to be urged in the United States First, protection is condemned on political grounds Its tendency is to rear up a group of favored industries Business men interested in these industries have a special inducement to watch tariff measures which others in the community lack They are too apt, under these circumstances, to become lobbyists and corruptionists Through them representatives, charged with shaping the tariff policy, are subjected to influences from which legislators ought to be exempt Secondly, protection is accused of being in practice a policy of change To be effective protective duties must adapt themselves to changing

industrial conditions But changes are always disturbing to business and at times disastrous Free trade, by making no discrimination between the home and the foreign producer, does not subject business to arbitrary fluctuations Thirdly, protection is criticized on financial grounds. Since the purpose of a protective tariff is not primarily revenue, the income which it affords to the government bears no regular nor constant relation to the latter's financial needs. At times it may burden the public treasury with an awkward surplus, which encourages reckless extravagance on the part of the legislature At others it may fail to bring in even that necessary minimum without which the business of government must be seriously interfered with Finally, certain protective duties are attacked as responsible for the trusts (q v) The argument is that without protection the branches of production concerned would have been open to world-wide competition, and that no merely national trust would have served to secure the monopoly powers after which the trusts are supposed to hunger If protection has created trusts, and trusts are undesirable, protective duties ought to be reduced, it is urged, until the offending trusts feel the wholesome restraints of foreign competition The conclusiveness of these arguments against protection can be determined only by weighing them against the counterarguments in favor of that policy, for which see the article on PROTECTION, and references there given

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FREE WILL A term used in theological and philosophical controversy in various senses Hoffding, in his *Ethics*, enumerates six different meanings that the term has actually borne These are 1 Will that is exempt from the principle of causation, will that is a cause, but not an effect 2 Will that is not determined by external compulsion In this sense "I have freedom to go out of my room if I have the key in my pocket and if the door is not barred, otherwise I am not free and must stay where I am" 3 Will that is not determined by inner compulsion In this sense, if I do what I like, I am acting freely, if, on the contrary, I act from fear, I am not free The express agent, e g, who at the muzzle of the revolver determines to hand over the key of the safe is not acting freely. He may indeed know what he is about and may choose this course as the wisest under the circumstances, but the circumstances are not to his liking He is not merely physically overpowered, he is also overawed, he prefers the surrender of the valuables committed to him to the loss of his life He is acting under the compulsion of fear 4 Will that is not debarred by its nature from making choice of good acts Certain Christian theologians have maintained that an unregenerate man may indeed choose between possible evil acts, but cannot choose to act morally Only by divine help, it is maintained, can a man will the good 5 Will that chooses between different courses In this sense the question of free will is not one whether the choice is determined, but whether there is really an experience of choice Thus, if I face a situation which seems to offer alternative courses of action and after deliberation adopt one course to the exclusion of others, my will is free If, on the contrary, I always act from blind impulse, not having the power to look alternatives in the face and choosing and rejecting, my will is not free 6 Will that is controlled by ethical motives Thus, a man who chooses a course because it appeals to him as right is said to act freely, a man, on the other hand, who, even though he considers alternative courses, finally adopts from passion or habit the one he judges to be wrong, is said to be the slave of his passion or of habit He is not free

Now, it is evident that with such varying meanings of the term any controversy about free will must be futile unless some one meaning is clearly adopted and maintained as the one at issue As a matter of fact, controversy on the subject has been confused by these different meanings Facts which point to freedom in one sense of the term have been urged as proving freedom in another sense, and the obvious connection of morality with one sort of freedom has been interpreted as involving a connection with freedom of another sort Thus, freedom in the fifth sense above mentioned is a fact of the most indubitable kind We often do face possibilities and make choice between them Whatever may be the explanation of such choice, the feeling that the choice is up to us is just as much a fact as any other fact in the world But to suppose that in making such a choice the will acts without determination by previous events, whether of heredity or environment, i e, to suppose freedom in the first sense, is to do more than accept the fact, it is to give a theory about this fact Again, that in civilized communities no one would think of holding a person responsible who is acting under external compulsion, or, again, that we judge more leniently a person who is acting under strong inner compulsion, is often used to prove that moral responsibility demands freedom in the sense of a will that is not subject to causal law Still again, confusion results from not discriminating between freedom in the sixth sense and freedom in the first sense given above There is, indeed, a feeling of superiority over circumstance enjoyed by the man who acts from ethical motives, and a sense of slavery often felt by the man who is a hopeless habitué to some evil practice, and yet the freedom of the former man should not be, as it often is, construed as implying that his will is not determined by its antecedents The classical problem of freedom concerns freedom as the exemption of the will from

causal determination, i e, freedom in the first sense given above

The history of controversy on this question is too long to be given here, even in outline In Christian theology St Augustine and Calvin were the protagonists of determinism, and Arminius and Wesley of freedom In this controversy too often the facts have been subordinated to the necessities of theological consistency or to the supposed implications of the moral judgment The theological determinists have generally started from the premise of the foreknowledge of God and His causal relation to all events in the world The conclusion demanded by this premise is that the will is determined God cannot be the cause of everything without being the cause of our volitions, and He cannot foreknow all events if our own volitions still hang in the balance The libertarians have started from the fact of moral responsibility, and, confusing two or more senses of the word "freedom," they have concluded that the will is not determined Even where the argument on this question has been carried on without theological presuppositions, there have often been metaphysical or scientific presuppositions For instance, it has been assumed that the law of causality holds good in everything and that the law of the conservation of energy has been proved to obtain universally The laws used by science are, as a matter of fact, only working hypotheses, confirmed in certain test cases coming within the reach of observation, and they have been found useful as guiding principles in further research But they should never be used dogmatically to prejudge any vital issue

In the matter before us it should be freely admitted that it has never been demonstrated that the will is universally subject to the law of causality The actually known facts are compatible with the acceptance of either determinism or free will, and whichever view one accepts one goes beyond known facts, as all generalizations of science do Now, the science of psychology has generally found it useful to assume determinism, and it is not usually psychological considerations that have led thinkers to believe in free will, although some writers, such as Bergson, do seek to build their defense of freedom on the immediate testimony of experience But experience does not seem to give any reliable testimony in behalf of freedom in the first sense of the word, it testifies to freedom only in some of the other meanings of the term

Now, it is probable that, apart from theological considerations, very little opposition to determinism would have arisen were it not supposed that moral responsibility would have to be regarded as an illusion on the deterministic hypothesis In other words, it is mainly in ethics that the question of freedom is a vital issue And here it becomes an issue only on one supposition, viz, that to hold a person responsible for his acts is reasonable only if his will is not determined Such a supposition, however, is either an a priori truth needing no demonstration, or a sheer dogma, or just a working hypothesis As an a priori truth it will be accepted by those who find it self-evident, it will be questioned by those who do not, and, unfortunately for such an alleged truth, there are many who do not find it self-evident Self-evidence is a firm prop for any theory only when there *is* self-evidence As a dogma, the supposition we are discussing is not worthy of scientific consideration It is only as a working hypothesis, therefore, that it merits attention from the scientific student

Now, taking the position that it is a working hypothesis in moral judgments, let us ask the inevitable question that always arises in dealing with such hypotheses Is it the only hypothesis that is satisfactory, or are there others that can equally or better rationalize the facts in question Let us remember, in answering this question, that morality is fundamentally social (see ETHICS), and let us follow the clue afforded by this character of morality What is the social import of responsibility? May not responsibility be regarded as a method adopted by society to secure from its members the kind of conduct that it regards as desirable? An affirmative answer to this question is what we shall now examine as a working hypothesis opposed to the libertarian hypothesis

On this hypothesis the tendency to condemn or to punish must be regarded as based on fundamental instincts which are in the first instance in no need of justification When we act instinctively, we just act, we do not first seek the approval of reason Reason, when it comes into play upon instincts, comes rather as a check than as an authorization Instinct may be said to be the motive power, and reason to be a brake to be applied when this power is liable to work harm We instinctively react hostilely to what displeases us, to what harms us or those in whom we are interested, to what offends our sense of propriety based on custom Such instinctive reaction needs no more justification than the instinct to eat or to propagate our kind But the results of this instinctive reaction may in some cases be found by experience to be prejudicial to other interests Then reason comes in as a check, reason in such a case being nothing but a harmonization of interest with interest, a repression of one interest in favor of another

This is what seems to have been the actual historical course taken in the historical development of condemnation and punishment Primitive justice is usually extreme and harsh, i e., it is simply and blindly instinctive, or it is instinctive with the instinct reinforced and intensified by habit and custom There is little or no reflection on the consequences of the punishment or condemnation meted out As time goes on, there is a mitigation of the severity of the hostile reaction, other interests besides blind opposition begin to assert themselves, and in so far as the consequences of inimical reaction are found to be prejudicial to these other interests, the reaction is withheld or modified Thus, the unmeasured character of savage punishment is reduced to measure by the law of retaliation, which to us seems harsh, but in reality was a great step towards the mitigation of punishment Again, primitive justice seems not to have taken the offender's intention into account This was inevitable in clan organizations, where the solidarity of the clan made it necessary to treat each individual as representative of the clan Only the individual offender intended his offense, but his intention could not be taken into account behind the solid front presented by the unintending clan in whom the individual is not recognized as such With the break up of the clan system punishment could become more personal, and the importance of intention could

gain recognition, the uselessness and wastefulness of punishment where there is no malice became obvious Still again, the harsh punishments which prevailed in England till within very recent times, e g, capital punishment for grand larceny, gave way before the knowledge that such punishments encouraged rather than discouraged crime Thus, we find that the degree of responsibility and the things for which responsibility is assessed vary with growing insight into the effects of assessing responsibility and with changes in social organization All through these changes the prime motive for exacting punishment is anger This anger, when coordinated and fused with other interests, becomes what we call moral indignation Just as anger in primitive society does not rest upon the conception that the infuriating offender is free, so moral indignation in more advanced communities does not necessarily continue only on license issued by such a conception Such a conception may be only a bad reason given for a subdued instinct So the determinist regards it Moral responsibility for him remains what it historically has always been, an instrument for enforcing ideals The question for him in exacting punishment and in awarding blame is not whether the offender might have acted differently, but whether by issuing and attempting to enforce demands he can be made to conform to these demands Where he can, blame and punishment economically administered are justified by the event, where he cannot, blame and punishment are futile Thus, responsibility does not disappear in a deterministic theory and in its practical carrying out, it merely submits to a different rationalization The ethical attitude towards the problem of free will thus is determined by the comparative satisfactoriness of the two hypotheses we have been considering As a matter of fact, up to the present, there is a disagreement as to this comparative satisfactoriness At the beginning of our century it seemed as if the determinists had all but won their battle in philosophical circles, to-day libertarianism is advocated by some very prominent thinkers For a metaphysical as distinguished from an ethical argument for libertarianism, see BERGSON For various aspects of the subject, see DETERMINISM, ETHICS, FATALISM, PREDESTINATION, WILL

Consult Edwards, *Freedom of the Will* (London, 1754), Spencer, *Psychology* (New York, 1869), Mill, *Logic* (London, 1856) and *An Examination of Sir William Hamilton's Philosophy* (ib, 1878), Dewey, *Study of Ethics* (Ann Arbor, 1894), James, *Principles of Psychology* (New York, 1899) and *Will to Believe* (London, 1897), Howison, *Limits of Evolution* (New York, 1901), Ward, *Essays on Philosophy of Theism* (London, 1884), Gutberlet, *Die Willensfreiheit und ihre Gegner* (Fulda, 1893), Piat, *La liberté* (Paris, 1894–95), Johnson, *The Will Problem in Modern Thought* (Macmillan, 1903), Meumann, *Intelligenz und Will* (Leipzig, Quelle and Meyer, 1908), Bergson, *Les données immédiates de la conscience* (Eng trans entitled *Time and Free Will*, New York, 1910), McDougall, *Body and Mind* (London, 1911), Horne, *Free Will and Human Responsibility* (New York, 1912), Croce, *Philosophy of the Practical* (Eng trans, London, 1913), W Bennett, *The Religion of Free Will* (Oxford, 1913), P E Lévy, *Rational Education of the Will* (Boston, 1914)

FREE-WILL BAPTISTS, or **FREE BAPTISTS** See BAPTISTS

FREEZ'ING MIX'TURES Mixtures of substances used to produce low temperatures The frigorific effect of such mixtures generally depends upon the following facts (1) melting, or the passage of a substance from the solid state to the liquid, involves the conversion of *sensible heat* into "latent heat," and if no heat is added to a melting substance from without, part of the sensible heat of the substance itself disappears, and therefore the temperature falls, (2) the solution of many salts in water causes the absorption of heat, and hence, again, if there is little or no addition of heat from the surroundings, there is caused a fall of temperature The efficiency of the first of these causes may be seen from the following If a piece of ice having the temperature of 0° C (32° F) is placed in its own weight of water at 79° C (174 2° F), it is found that, after the ice has melted, the temperature of the liquid is reduced to 0° C (32° F), much of the sensible heat which the water contained having thus disappeared during the melting of the ice The lowering of temperature by solution is illustrated in a striking manner by the fact that ammonium sulphocyanate, if thrown into its own weight of nearly boiling water, will reduce the temperature to the point of freezing, if thrown into its own weight of water of ordinary

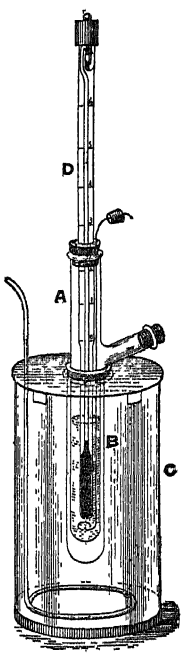
SUBSTANCES (PARTS BY WEIGHT)	Temperature attained	
	Cent	Fahr
100 parts of snow and 33 parts of common salt	−21°	− 5 8°
100 parts of snow and 300 parts of crystallized calcium chloride	−48 5°	−55 3°
100 parts of snow and 100 parts of dilute sulphuric acid (initial temperature, 5° C, or 41°F)	−41°	−41 8°
100 parts of snow, 13 5 parts of potassium nitrate, and 26 parts of ammonium chloride	−17 8°	0°
100 parts of snow, 52 parts of ammonium nitrate, and 55 parts of sodium nitrate	−25 8°	−14 4°
100 parts of snow, 9 parts of potassium nitrate, and 67 parts of ammonium sulphocyanate	−28 2°	−18 8°
100 parts of snow, 13 parts of ammonium chloride, and 37 5 parts of sodium nitrate	−30 7°	−23 3°
100 parts of snow, 32 parts of ammonium nitrate, and 59 parts of ammonium sulphocyanate	−30 6°	−23 1°
100 parts of snow, 2 parts of potassium nitrate, and 112 parts of potassium sulphocyanate	−34 1°	−29 4°
100 parts of snow, 39 5 parts of ammonium sulphocyanate, and 54 5 parts of sodium nitrate	−37 4°	−35 3°
100 parts of water, 26 parts of ammonium chloride, and 14 parts of potassium nitrate	−17 8°	0°
100 parts of water, 18 parts of ammonium chloride, and 43 parts of sodium nitrate	−22 4°	− 8 3°
100 parts of water, 55 parts of sodium nitrate, and 52 parts of ammonium nitrate	−25 8°	−14 4°
100 parts of water, 57 parts of sodium nitrate, and 57 parts of ammonium sulphocyanate	−29 8°	−21 6°
100 parts of water, 9 parts of potassium nitrate, and 67 parts of ammonium sulphocyanate	−28 2°	−18 8°
100 parts of water, 52 parts of ammonium nitrate, and 59 parts of ammonium sulphocyanate	−30 6°	−23 1°
100 parts of water, 5 parts of ammonium nitrate, and 113 parts of potassium sulphocyanate	−32 4°	−26 3°
Solidified carbon dioxide and ordinary ether	−100 0°	−148°

temperature, the same salt will reduce the temperature to —21° C (—5 8° F) In the mixture of pounded ice and salt used in making ice cream, the lowering of the temperature is due both to the conversion of sensible into latent heat during the melting of the ice and to the absorption of heat during the solution of the salt The following table shows the more important freezing mixtures and the temperatures that may be obtained by the use of them Supposing that there is no absorption of heat from the surroundings, the fall of temperature produced by mixing a given set of substances is determined by the amount of sensible heat absorbed (i e, the heat of fusion and solution) and by the specific heats of the substances between the initial and final temperatures The temperatures obtained depend, of course, upon the initial temperatures of the mixtures The initial temperature of any mixture given in the following table, unless otherwise specified, is assumed to be the freezing point of pure water

Substances employed as freezing mixtures, if solid, should be finely powdered, rapidly mixed, and placed in vessels that have but little conducting power These freezing mixtures are only available for use on a small scale. A fact extensively utilized for the production of low temperatures on a large scale is that, like the liquefaction of solids, the evaporation of liquids, too, involves the absorption of considerable amounts of sensible heat See EVAPORATION, REFRIGERATION, and especially FREEZING POINT For an extensive list of freezing mixtures, consult Landolt-Bornstein, *Physikalisch-chemische Tabellen*, pp 318–323 (Berlin, 1912)

FREEZING POINT The temperature at which a single pure substance can exist partly in the solid, partly in the liquid, state. If, while the substance is partly solid and partly liquid, heat is *added* to it, some of the solid portion melts, the added sensible heat changes into "latent heat of fusion" (see FREEZING MIXTURES), and, as long as the solid portion lasts, the temperature remains constant Again, the *abstraction* of heat can only be effected at the expense of the latent heat of the liquid portion, which is thereby gradually solidified, and hence, as long as the liquid portion lasts, the temperature remains constant If heat is neither added nor abstracted, the solid and the liquid portion remain in equilibrium, i e, neither does the solid melt nor the liquid solidify Now, as long as this equilibrium exists, the vapor tensions of the solid and liquid portions must be precisely equal If the vapor tension, say, of the liquid were greater than that of the solid, a process of distillation would take place, and the amount of solid would grow at the expense of that of the liquid, but, by definition and by common experience, if no heat is gained or lost, the relative amounts of solid and liquid remain, at the freezing point, unchanged The freezing point of a given substance may therefore be defined as *the temperature at which the substance has the same vapor tension in the solid and in the liquid state* That temperature may be referred to either as the freezing point of the liquid or as the melting point of the solid Thus, the freezing point of water is the same as the melting point of ice This is, however, true only in the case of a single pure substance In the case of solutions and all other sorts of mixtures the temperature at which freezing *commences* is by no means the same as the temperature at which the mixture, if entirely solidified, would begin to melt, the latter temperature is practically always lower, and can never be higher, than that at which solidification of the completely molten mass would first set in In other words the freezing point and the melting point of a given mixture of two substances *A* and *B* are by no means the same

Freezing Point of Solutions. An important fact to be remembered in connection with freezing solutions is that *ordinarily* the pure solvent alone freezes out It will be seen, further, that the freezing point of a solution is the lower the greater the amount of substance dissolved While, therefore, the solvent alone is freezing out, the temperature must obviously fall Hence, if we wish to speak of the freezing point of a solution of given strength, we must refer to the temperature at which freezing just commences, for freezing changes the composition Experience shows, however, that unless the given solution is very concentrated, and unless the amount experimented upon is very small, a moderate quantity of the solvent may be allowed to freeze out, without the result of the observation being thereby considerably impaired In other words, under proper experimental conditions, the difficult determination of the point at which freezing just commences is unnecessary The freezing point of solutions is generally determined by the use of Beckmann's apparatus shown in the accompanying figure The outer jar, *C*, contains some liquid whose temperature is kept constant and a few degrees below the freezing point of the given solution, a glass stirrer serving to keep the temperature uniform throughout the volume The wide tube, *B*, contains nothing but air and serves to prevent the too rapid cooling of *A* In making an observation, a known amount (say, 20 grams) of the pure solvent is introduced into the strong inner test tube, *A*, through the side tube, and when freezing has set in and the thermometer shows a constant temperature, the latter is carefully noted In this manner the freezing point of the pure solvent becomes exactly known Next, a known amount of the substance to be dissolved is introduced to the solvent in *A*, again through the side tube, the contents of *A* are caused to melt by removing *A* from *B*, and when all is dissolved *A* is replaced in *B*, again, when freezing has set in and the thermometer shows a constant temperature, the latter is carefully noted. In this manner the freezing point of the solution too becomes exactly known, and then the *difference* between the freezing point of the pure solvent and the solution is found by a simple subtraction The thermometer used in such determinations is of the Beckmann type, such a thermometer is usually graduated in one-hundredths of a de-



BECKMANN'S APPARATUS

gree and permits of reading differences within one-thousandth of a degree—a precision by no means too great for the purpose involved A great many determinations of this nature, carried out with a great variety of substances, led the Frenchman Raoult to the establishment of the following law *The freezing point of a solution is lower than that of the pure solvent, the difference being, for the same substance, proportional to the amount, and, for different substances, not only proportional to the amounts, but also inversely proportional to the molecular weights of the substances dissolved* A comparison of this law with the one that holds good for the elevation of the boiling point (see BOILING POINT) will show the perfect analogy between the two laws Here, too, as in the case of the boiling point, the simple law holds good only for substances whose solutions do not conduct electricity, matters being much more complicated in the case of solutions of electrolytes (See DISSOCIATION) Raoult's law permits of determining the unknown molecular weights of newly discovered substances The art of precisely measuring freezing-point depressions for this purpose is called *cryoscopy*. The observer determines the freezing points of the pure solvent and of two equally strong solutions in the same solvent—one containing the new substance, the other some substance of known molecular weight—and then the molecular weight of the given substance is found simply by the rules of proportion More usually, the molecular weight of a substance is calculated by Raoult's formula $M = E\frac{m}{t}$, in which M is the desired molecular weight, t is the freezing-point depression produced by dissolving m grams of the substance in 100 grams of the solvent, and E is the so-called molecular depression of the freezing point This quantity E varies from solvent to solvent Van't Hoff has shown that for a given solvent E may be *calculated* by the following theoretical formula

$$E = \frac{0\ 02T^2}{r},$$

where T is the freezing point of the pure solvent (in absolute degrees) and r is the latent heat of fusion of 1 gram of the pure solvent The solvents most frequently employed for such determinations are glacial acetic acid, water, and benzene Still, other solvents too can be and are frequently employed The molecular depressions E for the three solvents just mentioned are

Solvent	E
Acetic acid	38 5
Water	18 6
Benzene	52

See MELTING POINT, SOLUTION, MOLECULES—MOLECULAR WEIGHTS

Nernst and Abegg's Theory of the Freezing Point The determination of the freezing point, as explained above, seemed to be a perfectly reliable operation until experience had shown that considerably different results are obtained by using apparatus different in size and shape, by having different temperatures in the outer jar (C), and by varying the rate of stirring in the inner tube (A) In 1894 Nernst and Abegg gave a mathematical explanation of this important phenomenon—important because of its connection with the theory of solutions and with the determination of molecular weights The principle of these calculations is as follows The temperature in the outer jar (C) is, as we have seen, kept a few degrees below the freezing point of the given solution If the latter did not freeze and were not stirred, heat would flow from it into the outer vessel until the temperature in A and in C would be the same This flow of heat would take place, for a given form of apparatus, at a rate proportional at any instant to the difference of temperature at that instant between A and C On the other hand, regular stirring would cause the formation of sensible heat in A at a constant rate When the steadily diminishing rate of the outflow of heat from A to C becomes equal to this constant rate of production of heat in A, the temperature in A must evidently become constant This constant temperature Nernst and Abegg term the "convergence point" All this, however, presupposes that the liquid in A does not freeze Suppose, now, that as soon as the solution has reached the convergence point, freezing has set in, and suppose that in a given case the convergence point is lower than the freezing point During freezing the latent heat of fusion is evolved as sensible heat, and the temperature rises, tending to approach the true freezing point of the solution There is experimental evidence to the effect that the rate at which the temperature thus rises is, at any instant, proportional to the distance of the temperature at that instant from the true freezing point In other words, the nearer to the true freezing point, the slower the freezing, and hence the slower the variation of the temperature caused by it But "the nearer to the true freezing point" means "the farther from the convergence point", and we have seen that the farther from the convergence point, the more rapid the rate of variation in the direction of that point There must therefore exist, somewhere between the true freezing point and the convergence point, a point at which the rates of variation upward towards the true freezing point, and downward towards the convergence point, are precisely equal That point Nernst and Abegg term the "apparent freezing point" And they justly maintain that, everything being taken into account, the temperature usually observed, after variation has ceased, is not the *true* freezing point, which is, of course, dependent on nothing but the nature and strength of the given solution, but the *apparent* freezing point, which may obviously depend on the temperature of the outer jar, on the amount of solution experimented upon, on the rate of stirring, on the specific rate of freezing or melting of the solvent, etc The effect of stirring is so considerable that in several cases the convergence point has been found to lie, not below, but above the true freezing point, in spite of the somewhat low temperature in the outer jar In such cases, too, the apparent freezing point is, of course, somewhere between the true freezing point and the convergence point The difference between the true and apparent freezing points is, as might be readily supposed, not very great In fact, in many cases (e g, in the case of common salt) it may be safely neglected In other cases, however (e g, in the case of weak solutions of cane sugar), it must be taken into account if results at all reliable are to be obtained The exact way of applying the theory in practice, with a view to ascertaining the true freezing point of solutions, may be found described

the original memoir, by Nernst and Abegg, in vol xv of the *Zeitschrift fur physikalische Chemie* (1894), and even better in a monograph by Raoult, *Cryoscopie de Précision* (Grenoble, 1899) It scarcely needs to be added that at the apparent freezing point there is really *no equilibrium* between solid and liquid, that either melting of the solid portion or freezing of the liquid portion is continually going on, according as the apparent freezing point is above or below the true freezing point of the solution

Cryohydrates We have seen above that generally the pure solvent alone freezes out of solutions, and that the freezing out of much of the solvent would cause a corresponding depression of the freezing point In other words, if freezing were allowed to go on to a large extent, the given solution would become more and more concentrated and the temperature would fall lower and lower Finally the solution would become saturated Further freezing would then naturally cause the precipitation of the substance dissolved, the concentration of the solution would remain constant, and hence the freezing temperature, too, would remain constant At one time solutions thus having a constant freezing point were taken to be chemical compounds of the dissolved substances with the solvent and were therefore named "cryohydrates" It is now clear, however, that there is no more reason for such an assumption than there is for assuming that, in general, any saturated solution is a true chemical compound The substance freezing out of a saturated solution is nothing but a mechanical conglomerate of the frozen solvent and the substance originally dissolved, and, of course, the melting temperature of this mixture, being identical with the freezing temperature of the saturated solution, is likewise constant It is also clear that the melting point of the cryohydrate is the lowest temperature at which a solution of a given substance in a given solvent can exist Hence, by mixing ice with salts in the proportion in which they would form cryohydrates, we can obtain freezing mixtures having the lowest *constant* temperature that can possibly be attained with the given salts Cryohydrates are now classed with the so-called "eutectic mixtures" See MELTING POINT

Cryohydrates are at times extremely useful in that they permit of establishing and maintaining perfectly constant temperatures below the freezing point of water Following is a list of constant temperatures that may be obtained with the aid of a number of ordinary salts (hydrated) and finely divided ice.

Hydrated salt	Constant temperature (° C)
Acid sodium phosphate	−1
Sodium sulphate	−1 2
Copper sulphate	−1 6
Sodium carbonate	−2 1
Magnesium sulphate	−5 0
Zinc sulphate	−6 55
Calcium nitrate	−16
Sodium chloride	−21 3
Sodium bromide	−28
Potassium carbonate	−36 5
Calcium chloride	−55
Zinc chloride	−62

FREEZING PROCESS FOR FOUNDATIONS See FOUNDATION

FREE ZONE. See ZONA LIBRE

FREGENAL DE LA SIERRA, frā′ĭĭā-näl′ dā lā sē-âr′rā. A town in the Province of Badajoz, Spain, 50 miles south by east of the city of Badajoz (Map Spain, B 3) It is situated in a fertile and picturesque valley north of the Sierra Morena Mountains and is laid out with regular and spacious streets There are plazas and fine buildings The ancient castle, which was erected by the Templars to whom the town was granted in 1283, has been converted into a bull ring The town has a considerable trade in cattle and manufactures cloth, baize, hats, leather, and flour Pop, 1900, 9582, 1910, 10,415

FREHER, frā′ẽr, MARQUARD (1565–1614) A German historian, born at Augsburg He studied law at Altdorf and Bourges, was professor of Roman law at Heidelberg (1596–1614), and was frequently sent as Ambassador to Poland and other countries by the Elector Frederick IV He published several important historical works in Latin, among which the work *Origines Palatinæ*, with its interesting information on Heidelberg and other early German settlements, is among the most important It was first printed in 1599 and has since been frequently republished Consult *Ersch und Gruber*, vol xlviii, pp 416–417

FREIBERG, frī′bĕrk An old and important town of Saxony, the centre and seat of the mining district and mining administration of Saxony, on the north slope of the Erzgebirge, 1325 feet above sea level and 25 miles southwest of Dresden (Map Germany, E 3) Freiberg retains portions of its fortifications and many old buildings The southern portal of the late Gothic cathedral (1490–1512), known as the "Golden Door," is a relic from the ancient Romanesque church built on the same site, but burned down in 1484 The sculptures on this door are considered among the finest of the plastic ornamentations of the Middle Ages The church contains the burial vault of 41 Protestant Saxon princes descended from Henry the Good, and a large organ built by Silbermann Also worthy of note are the old castle of Freudenstein, constructed in 1577, now used as an arsenal, the late Gothic Rathaus dating from the beginning of the fifteenth century, and the sixteenth-century Kaufhaus, with its museum of antiquities, a library with 10,000 volumes, and the King Albert Museum Among the educational institutions are a sixteenth-century gymnasium and the famous mining academy, founded in 1765 and attended by students (422 in 1913) from all parts of the world The school possesses extensive geological and mineralogical collections, chemical and assay laboratories, a library of 50,000 volumes, and the Werner Museum Other institutions are a trade school, an agricultural school, a gymnasium, and a state experiment station for the leather industry

Freiberg has large smelting works and foundries The largest mines were acquired by the state in 1886, but all but a small part for the use of the mining academy was abandoned as a state enterprise in 1913 There are now about 30, though formerly the number ran as high as 60 They produce chiefly silver and lead They are annually visited by many mining experts and tourists There are manufactures of gold and silver wire, machinery, leather, woolens, fertilizers, cigars, powder, chemicals, pianos, scientific instruments, baskets, and linen The city is lighted by gas and electricity and has an electric street railway Pop, 1890, 28,-

955, 1900, 30,175, 1910, 36,237 The city owes its origin to the discovery of silver in the vicinity in the twelfth century It was strongly fortified and obtained municipal privileges about the beginning of the thirteenth century After being subject to various rulers it fell to the Saxon Albertine line in 1485 Consult Gerlach, *Kleine Chronik von Freiberg* (Freiberg, 1898), *Freibergs Berg und Huttenwesen, herausgegeben durch den Bergmannischen Verein zu Freiberg* (ib, 1893), Ledebur, *Ueber die Bedeutung der Freiberger Bergakadamie* (ib, 1903), H Muller, *Die konigliche sachsische Bergakadamie zu Freiberg* (ib, 1904)

FREIBERG, HEINRICH VON See HEINRICH VON FREIBERG

FREIBURG, frī'bōōrk The attractive capital of a district of the same name in the Grand Duchy of Baden, Germany, and the former capital of Breisgau (q v), situated in the charming valley of the Dreisam, about 11 miles east of the Rhine and 72 miles south-southwest of Karlsruhe (Map Germany, B 5) The environs are exceptionally beautiful, embracing a rich plain, lovely vine-clad hills, and a portion of the picturesque Black Forest In appearance Freiburg very agreeably combines features of an ancient and a modern city It contains numerous specimens of mediæval architecture, and there remain portions of the old fortifications, though these have been chiefly replaced by public walks and vineyards The cathedral, a rival of the Strassburg Minster and restored since 1880, is one of the most perfect specimens of Gothic architecture in Germany It is of red sandstone, the Romanesque transept and the side towers dating probably from the twelfth century The choir was not completed before the beginning of the sixteenth century The famous tower, considered the finest of its kind in Europe, with chimes and a curious clock, is 386 feet high and has a square base, an octagonal bell tower, and a pyramidal spire of open stonework The main portal is richly decorated with allegorical figures, and the beautiful interior contains numerous excellent examples of stained glass belonging to different periods, creditable monuments, and a number of masterly altarpieces by Hans Baldung and Holbein the Younger Other interesting ecclesiastical edifices are the Roman Catholic church of St Martin, dating from the thirteenth century, with a modern tower, and the Protestant Ludwigskirche, constructed in Romanesque style in 1829–39

The noteworthy secular buildings of Freiburg include the sixteenth-century Rathaus, adorned with frescoes, the Kaufhaus, or Merchants' Hall, with a vaulted portico and statues of German rulers on the outer walls, the Kornhalle, with a fine concert hall, the old university, a sixteenth-century Renaissance structure, now annexed to the Rathaus, the new university, formerly a convent, the municipal theatre, and the grand ducal palace Freiburg is not only well provided with handsome promenades, but is rich in monuments and memorial fountains, the most prominent of the former being the monument erected to the Fourteenth German Army Corps in 1876, and the monument to Berthold Schwarz, the alleged inventor of gunpowder The celebrated University of Freiburg, founded by the Archduke Albert VI of Austria in 1457, has four faculties, about 150 professors and teachers, and an attendance of about 2500 students in 1912. There are attached to it a library of 270,000 volumes and 600 manuscripts, and a number of collections and institutes Besides the university, there are two gymnasia and two *Realschulen*, several special schools, museums, a theatre, and numerous scientific and art associations

Freiburg has electric lights, an electric street railway, fine water supply, a sewage farm, and several hospitals and charity houses The city is well known for its manufactures of silk thread, glass, artificial pearls, buttons, paper, furniture, scientific and musical instruments, machinery, chocolate and sugar products, wine, tobacco, cigars, etc The city is the chief export point for the Black Forest district It has been the seat of an archbishop since 1827 Among the attractions on the outskirts is the Schlossberg, with an ancient ruined fortress and pleasure grounds Pop, 1900, 61,506, 1910, 83,324

The foundation of Freiburg about the year 1090 is attributed to Count Berthold III of Zahringen It became a free town in 1120 and attained considerable prosperity With the death of the last member of the house of Zahringen, Freiburg passed in 1219 to the counts of Urach, whose interference with the rights of the burghers was followed by popular uprisings The city finally bought its independence in 1366 for 20,000 silver marks and passed under the protection of the house of Hapsburg (1368) During the Thirty Years' War it was taken repeatedly by the Swedes In 1644 a bloody engagement took place here between the French and the German Catholics It belonged to the French from 1677 to 1697 Freiburg came into the possession of Baden in 1806 In 1848 it was the scene of a conflict between the insurgents and the troops of the German Confederation In the following year the revolutionary government was expelled from the town by the Prussians, who remained there until 1851 Consult Rietschel, *Die alteren Stadtrechte von Freiburg im Breisgau* (Vierteljahrschrift, Berlin, 1905)

FREIBURG (Swiss city and canton) See FRIBOURG

FREIDANK, frī'dank (MHG *Vridanc*) The name assigned to the author of a German thirteenth-century didactic work entitled *Bescheidenheit*. He was probably a native of Swabia and accompanied the crusading army of Frederick II to the Holy Land, where he composed a portion of his poem, about 1228–29 It is a sort of anthology of adages and moral reflections containing much worldly wisdom and was very popular throughout the Middle Ages and well into the sixteenth century Many manuscripts still exist of the original, which was translated into modern German by Simrock (1867), Bacmeister (1875), and Pannier (1878)

FREIGHT (ME *freyt, fraught*, Dutch *vracht*, OHG *frēht*, from Goth *fra*, before + *aihts*, property, probably influenced by Fr *fret*, freight, from the same source) The hire of a ship, or part of a ship, for the transport of merchandise, also the merchandise so transported The agreement for the service is termed a charter party (q v) If a merchant freight a whole ship, but neglect to fill it, the captain is not at liberty to complete the cargo from other sources, without accounting to the merchant for any moneys received for such additional load On the other hand, if the merchant covenant to freight a certain portion of a ship, he is bound to pay the sum agreed on for that portion, notwithstanding that his goods may fail to occupy

so much space If in the charter party a day be appointed for sailing, and either the merchant fail to have his goods ready for embarkation by the time fixed, or the vessel be unprepared to start—wind and weather permitting—the agreement may be declared void by the aggrieved party, who can also recover at law for any detriment caused to his property in consequence of the delay The use of charter parties has been traced back as far as the reign of Henry III This contract, which in England, and generally in the commercial language of the United States, is called freight, is more commonly spoken of by the legal writers of Scotland as *affreightment* (q v), from the French *affrètement* (Bell, *Com*, i, p 414), but there is no essential difference in the laws of the two countries with regard to it Throughout the whole commercial world, indeed, in so far as its provisions are not made the subjects of positive stipulation either by charter party or *bill of lading* (q v), they will be held to be in accordance with the usage of trade, and of that particular branch of trade to which the hiring has reference The contract for freight is generally considered to be an "entire" contract and not capable of part performance It contemplates the completion of the voyage and the safe arrival of the cargo at its destination. Usually, therefore, no freight is earned in the event of a loss at sea, nor in case of a delivery at any other port than the one specified in the charter party

It was formerly held that the payment of the wages of the crew was contingent on the earning of freight by the ship, in accordance with the maxim of Lord Stowell, that "freight is the mother of wages" But this rule, which was already subject to many exceptions, has been abrogated in Great Britain by the Merchant Shipping Act (17 and 18 Vict, c 104), and by statute in the United States, and wages may now be recovered either by seamen or apprentices, even though no freight has been earned by the vessel, but in cases of shipwreck the claim for wages will be barred if it be proved that the man did not exert himself to the utmost to save the ship, cargo, and stores The provision was first introduced by 7 and 8 Vict, c 112, § 17, which enacted that, in order to enable him to recover his wages, the seaman should be bound to produce a certificate from the master or chief surviving officer of the ship, to the effect that he had so exerted himself By § 183 of 17 and 18 Vict, c 104, the onus of proof is very properly laid on those who impugn the conduct of the seaman The old rule is still adhered to in America, but it is not applied to the master, and it does not hold with reference to seamen if the freight has been lost by the fault either of the master or owner, e g, if the ship has been seized for debt or for having contraband goods on board

The word "freight" is a term formerly applied only to maritime business, such as the hire and use of vessels, but more recently extended to goods transported on land, as on railways where there are regular "freight" cars The term is used to signify also the money or consideration paid for carrying With regard to freight by ships, the laws of the United States are practically the same as in England

While much ocean freight is still carried by specially chartered or other steamers which follow no definite routes but seek cargoes wherever they can be found, the greater part of oversea-freight carrying is done by lines of freight steamers (usually having accommodation for a few passengers) which run over definite routes and have regular dates of sailing The sailing ship has become a negligible factor in freight carrying Consult L D Weld, *Private Freight Cars and American Railways* (New York, 1908), E Watkins, *Shippers and Carriers of Interstate Freight* (Chicago, 1909), J A Droege, *Freight Terminals and Trains* (New York, 1912), J F Strombeck, *Freight Classification* (Boston, 1912) Consult also the reports of the United States Committee on Interstate Commerce See CARRIER, COMMON, TRANSPORTATION

FREILIGRATH, frī'lik-rat, FERDINAND (1810–76) A popular German lyric poet of originality, an admirable translator, and a sturdy liberal agitator, born at Detmold His father was a teacher Though apprenticed to a grocer at 15, Freiligrath continued his studies and published verses in local journals before he was 20 The years 1831 to 1836 he spent as banker's clerk in Amsterdam Then, after publishing translations of Hugo's *Odes*, and *Chants du crépuscule*, and launching a literary journal, *Rheinisches Odeon* (1836–38), he became a bookkeeper at Barmen, but continued writing lyrics, of which a volume (1838) won immediate and wide favor This contained the famous "Löwenritt," "Prinz Eugen," and "Der Blumen Rache," among his masterpieces He afterward gave himself wholly to literature, cooperating in several now unimportant works, and gaining a pension of 300 thalers from the Prussian King Gradually his associates drew him into political strife In 1844 he surrendered his pension, and in his *Glaubensbekenntnis* placed his poetic gifts at the service of the democratic agitation that was to culminate in the revolution of 1848 Such poems as "Trotz alledem" (a translation of Burns's "A man's a man for a' that"), "Die Freiheit," "Das Recht," and "Hamlet," made his absence from Germany expedient He went to Belgium and Switzerland, published in 1846 *Englische Gedichte aus neuerer Zeit*, a volume of fine translations, and *Ça ira*, a collection of political songs, and lived till 1848 in England At the invitation of Longfellow, whom he knew personally, he meditated going to America, but on the short-lived triumph of liberalism returned to Germany as a democratic leader, was for a time imprisoned, published *Zwischen den Garben* (1849) and *Neue politische und soziale Gedichte* (1850), after which he went once more into exile in England (1851), where he remained till 1868, as representative of a Swiss bank He made some admirable poetic translations, among which an anthology, the *Rose, Thistle, and Shamrock* (1854), and Longfellow's *Hiawatha* (1857), with Shakespeare's *Cymbeline* and *Winter's Tale*, are worthy of record for their felicity and faithfulness These kept up his popularity in Germany, where in 1866 a subscription of 60,000 thalers was raised for him, partly as a political manifesto The general amnesty proclaimed in 1868 brought him back in time to celebrate the triumph of 1870 in the popular "Hurrah, Germania!" and "Die Trompete von Vionville" Freiligrath's works are collected in 8 vols (Stuttgart, 1870–71), and those up to 1858 in 6 vols (New York, 1858–59) There is a volume of select translations into English, ed by his daughter, Mrs Kroeker (Leipzig, 1871) For his biography, consult Kippenberg, (Leipzig, 1868), Schmidt-Weissenfels (Stuttgart,

1876), Buchner, *Ferdinand Freiligrath, Ein Dichterleben in Briefen* (Lahr, 1881–82), Richter, *Freiligrath als Uebersetzer* (Berlin, 1899), Rodenberg, *Jugenderinnerungen* (ib, 1899)

FREIMUND RAIMAR, frī'mōōnt rī'mar A pen name of the German poet Friedrich Ruckert (q v)

FREIND, frīnd, JOHN (1675–1728) An English physician He was born at Croton in Northamptonshire, graduated at Christ Church, Oxford, in 1698, entered the medical profession, and in 1705–07 acted as physician to the English army under the Earl of Peterborough in Spain In 1722 he was a member of Parliament, but being suspected of favoring the restoration of the Stuarts, he was imprisoned in the Tower for six months From 1727 until his death he was physician to Queen Caroline He published several works on medical subjects, the most important of which is his *History of Physick from the Time of Galen to the Beginning of the Sixteenth Century, chiefly with regard to Practice* (2 vols, 1725–26) His brother, ROBERT (1667–1751), was a well-known classical scholar

FREIRE, frā'ē-rā, RAMÓN (1787–1851) A Chilean soldier and legislator, a grandson of Freire de Andrada, born at Santiago, Chile He served in the War for Independence from 1811 to 1820 and soon thereafter became the leader of the Liberal party, which elected him Supreme Dictator of the government in 1823, his reelection following in 1827 In this capacity he put an end to Spanish domination in Chile in 1826, when he forced the last Spaniards to leave the island of Chiloé Upon the accession of the Conservative party to power he led an army revolt and was banished to Peru He returned in 1842, after an absence of five years, but did not reenter politics There is a bronze statue of him in Santiago

FREIRE DE ANDRADA, dā an-dra'da, GOMES (1685–1763) A Brazilian administrator, born at Coimbra, Portugal From 1733 until shortly before his death he was Governor and Captain General of Rio de Janeiro, and his administration finally extended also to the other provinces of Brazil He contributed greatly to the development of the mining interests of the country and was an active promoter of colonization and public works The war over the boundaries of Brazil and Paraguay was fought during his administration (1754–56) As the greatest colonial Governor of Brazil, his achievements have been celebrated in the epic poem entitled *Epicos Brasileiros* (2d ed, under the title *O Uraguay*, 1811), by José Basilio da Gama

FREISCHUTZ, frī'shuts (Ger free shooter). A legendary marksman who enters into compact with the devil that six balls from his gun shall follow his own will, but the seventh the devil's The idea was general in the fourteenth and fifteenth centuries and especially during the Thirty Years' War It emerged in literature in Apel's *Gespensterbuch* (1810–15) and as adapted to Weber's opera, *Der Freischutz* (1821, text by F. Kind), is universally known

FREISCHUTZ, DER (Ger. The Poacher) An opera by Weber (q v), first produced in Berlin, June 18, 1821, in the United States, March 3, 1825 (New York)

FREISING, frī'zing A town of Upper Bavaria, situated on the Isar, about 22 miles northeast of Munich (Map Germany, D 4) It is of Roman origin and has a fine restored twelfth-century Romanesque cathedral, with two towers and a curious quadruple crypt The former episcopal palace is now occupied by a clerical seminary The historian Otto von Freising was Bishop here from 1137 to 1158 Freising has a theological lyceum, a gymnasium, a teachers' seminary, and a preparatory school, and a number of benevolent institutions The chief manufactures are agricultural machinery, pottery, and stained glass Near Freising is the former Benedictine abbey Weihenstephan, now an agricultural bureau, with a training school for brewers and fruit growers The town was the capital of the bishopric of Freising, which was founded in 724 by the Romans and united in 1803 to the bishopric of Munich Pop, 1900, 10,092, 1910, 14,946

FREISING, OTHO OF See OTHO OF FREISING

FREJES, frā'hēs, FRANCISCO (?–1845) A Mexican historian He was born in Guadalajara, was educated for the priesthood, and became a Franciscan monk He became widely known as a pulpit orator, but left the pulpit to pursue his historical studies For this purpose he entered the Convent of Guadalupe in Zacatecas, and he became its superior in 1838 His most valuable work was his *Historia breve de la conquista de los estados independientes del imperio mejicano* (new ed, 1878) He also wrote *Memoria histórica de los sucesos mas notables de la conquista particular de Jalisco por los Españoles* (1842)

FREJUS, frā'zhus' (Lat *Forum Julii*). A town in the Department of Var, France, situated 15 miles southeast of Draguignan (Map France, S, L 5) It is a bishop's see since the fourth century and is much frequented as a health resort Originally settled from Marseilles, it was afterward colonized anew by Julius Cæsar and called Forum Julii Its numerous Roman remains, including walls, a pharos, a circus seating 12,000 spectators, and a viaduct constitute its only importance to-day Augustus made the harbor, which is now silted up, the most important naval station in Gaul Among its long list of native celebrities are Agricola the general, Roscius the actor, Cornelius Gallus the poet, the Abbé Sieyès, etc Pop, 1901, 4156, 1911, 4022

FREKI See GERI AND FREKI

FRELINGHUYSEN, frē'ling-hī'zen, FREDERICK (1753–1804) An American lawyer and soldier, grandson of Theodorus Jacobus Frelinghuysen He was born in Somerset Co, N J, graduated at Princeton in 1770, studied law, and was admitted to the bar in 1774 In 1775 he was elected to the Provincial Congress of New Jersey and at the outbreak of hostilities became a member of the Committee of Public Safety He was elected again in the year following, and in the constitutional convention took an active part in drawing up the new Constitution He was a major in the "Minute Men" organization early in 1776 and recruited and became captain of the Eastern Artillery Company He participated in the battle of Trenton, and it is said to have been a shot from his pistol that mortally wounded Colonel Rahl, the Hessian commander Early in 1777 he was made colonel of New York militia and took part in all the military operations of Washington's army in that year and in the battle of Monmouth, in June, 1778 In 1778–79 and in 1782–83 he was a member of the Continental Congress During the next 10 years he practiced his profession, attaining great eminence, and from 1793 to 1796 he was a

United States Senator In 1794, during the Whisky Insurrection, he served as a major general of the New Jersey militia

FRELINGHUYSEN. FREDERICK THEODORE (1817–85) An American lawyer and political leader, a grandson of Frederick Frelinghuysen He was born in Millstone, N J, graduated at Rutgers College in 1836, studied law in the office of his uncle and adoptive father, Theodore Frelinghuysen, at Newark, and in 1839, though but 22 years old, succeeded to his large practice He was city attorney of Newark in 1849 and became widely known as a counsel of many important corporations, among them the Central Railroad of New Jersey and the Morris and Essex Canal Company Originally a Whig in politics, he was one of the founders of the Republican party in New Jersey In 1861 he was a delegate from New Jersey to the Peace Congress at Washington, and in the same year became Attorney-General of the State, serving until 1866 He was appointed United States Senator in 1866 to fill the vacancy caused by the death of William Wright, and he served until 1869, achieving a reputation as an able debater In 1870 he was appointed Minister to Germany, but declined the appointment after he had been confirmed by the Senate In 1871 he was elected to the United States Senate After the disputed election of 1876 he was one of the framers of the bill creating the Electoral Commission, and after the commission was constituted, in 1877, served as one of its members After several years spent in the active practice of his profession he again entered political life (in December, 1881), succeeding James G Blaine as Secretary of State in President Arthur's cabinet He was a trustee of Rutgers College and president of the American Bible Society

FRELINGHUYSEN, THEODORE (1787–1862) An American legislator and educator, son of Gen Frederick Frelinghuysen He was born at Millstone, N J, graduated at Princeton in 1804, was admitted to the bar in 1808, raised and commanded a company of volunteers in the War of 1812, and from 1817 to 1829 was Attorney-General of New Jersey In 1828 he was elected to the United States Senate, where he was a prominent debater on the Whig side, taking an especially active part in the discussions over the rechartering of the United States Bank and the withdrawing of the government deposits therefrom, and over the tariff, but, failing of reelection in 1835, he resumed the practice of his profession in Newark, N J, of which city he was mayor in 1837 and 1838 He was chancellor of the University of the City of New York from 1839 to 1850, was the Whig candidate for the vice presidency on the ticket with Henry Clay in 1844, and was president of Rutgers College from 1850 until his death Consult Chambers, *Memoir of Theodore Frelinghuysen* (New York, 1863)

FRELINGHUYSEN, THEODORUS JACOBUS (1691–1747) An American clergyman He was born in West Friesland and, after holding a pastorate there, came to America and settled in New Jersey as a missionary of the Reformed Dutch church (1720) He became widely known as an eloquent preacher, especially during the revival period known as the Great Awakening, and was a delegate to the first convention of the Reformed Dutch church, held in New York Several of his sermons, delivered in Dutch, were published at Utrecht, where they were most favorably received, others, translated into English by William Demarest, with a biographical sketch, were published in 1856

FRE'MANTLE The chief seaport of Western Australia, in Swan County, at the mouth of the Swan River, 12 miles southwest of Perth (Map Australia, D 6) Its harbor has been much improved, has a fine modern town hall with a lofty clock tower, a handsome Anglican church, a hospital, an insane asylum, and a literary institute with a public library It manufactures leather, beer, flour, furniture, lumber, soap, iron and steel goods, and ships On an island in the harbor are government salt works The town is divided into three districts—Fremantle, Fremantle East, and Fremantle North Pop, 1901, 14,623, 2489, and 3247, 1911, 14,499, 3856, and 3315, respectively

FREMANTLE, SIR EDMUND ROBERT (1836–) An English naval officer, born in London and educated at Cheam School, Surrey He entered the navy in 1849, served in the Burmese War in 1852, became lieutenant in 1857 and commander in 1861, was in the New Zealand War in 1864–66 and in the Ashanti War of 1873–74, blockaded the east coast of Africa in 1888–89 and commanded the Witu punitive expedition of 1890, became vice admiral in 1890 and (after commanding in China in 1892–95) admiral in 1896 He wrote the Royal United Service Institution prize essay on *Naval Tactics* (1880), sketches of Hawke and Boscawen in *From Howard to Nelson,* and *The Navy as I have Known It* (1905)

FREMANTLE, WILLIAM HENRY (1831–) An English clergyman He was educated at Balliol College, Oxford, was fellow of All Souls from 1854 to 1864, was ordained in 1855, was select preacher at Oxford in 1879–80 and Bampton lecturer in 1883 From 1883 to 1894 he was fellow and tutor in theology at Balliol He was canon of Canterbury from 1882 to 1895, when he was appointed dean of Ripon His works include *The Ecclesiastical Judgments of the Privy Council* (1865, with G C Brodrick), *The Gospel of the Secular life* (1882), *The World as the Subject of Redemption* (1885, Bampton Lectures), *Church Reform* (1887), a version of the principal works of St Jerome (1893), *Christian Ordinances and Social Progress* (1901), *Natural Christianity* (1911)

FRÉMIET, frā'myā', EMMANUEL (1824–1910) A prominent French sculptor He was born in Paris, and studied under his uncle Rude He began his artistic career as lithographer to the Museum of Natural History and for a time was also employed to paint the corpses in the Morgue In 1843 he achieved marked success with his "Gazelle," which was followed by a group of animal studies, of which "The Mother Cat" and "A Hunting Dog" received medals and were bought by the state In 1850 his "Wounded Hound," now in the Luxembourg, made a great sensation From this time he exhibited constantly, and in 1855 Napoleon III commissioned him to model a series of military statuettes, some of which are preserved in the Frémiet Barbedienne collection In 1875 he succeeded Barye as professor of drawing and modeling at the Jardin des Plantes His celebrated "Gorilla Carrying off the Body of a Woman," refused at the Salon of 1859, received the medal of honor (1887). He received the Grand Prix at the Exhibition of 1900 Many

critics consider him superior to Barye in his animal studies, and his originality, his knowledge of anatomy, and the power and realism of all his work are unquestioned Other statues and groups are the graceful "Faun," in the Luxembourg, the well-known equestrian statue of Jeanne d'Arc, in the Place des Pyramides, Paris—a bold and spirited production, admirable in movement Other versions are at Nancy and in Fairmount Park, Philadelphia Among other noteworthy works are "The Man of the Stone Age", equestrian statues of Napoleon I at Grenoble, the Duke of Orléans at Pierrefonds, the Prince of Condé, the colossal elephant of the Trocadéro Fountain, Paris, "A Mounted Torch-Bearer of the Fifteenth Century", and the statues of De Lesseps at Suez (1899, Chantilly Museum), Du Guesclin at Dinan—one of his finest works, Colonel Howard in Baltimore, Md, and Velazquez, Jardin de l'Infante, Louvre, "St Michael" for the spire of Mont St Michael, and "Meissonier" at Poissy His extensive exhibit at the St Louis Exhibition (1904) included bronze statues of St George, a "Gorilla of Gabun," and "Race Horses" Fremiet was a grand officer of the Legion of Honor and a member of the Institute Consult his biography by De Biez (Paris, 1910)

FREMONT' A city and the county seat of Dodge Co, Neb, 37 miles northwest of Omaha, on the Union Pacific, the Chicago and North-Western, and the Chicago, Burlington, and Quincy railroads (Map Nebraska, H 3) It has important dairying and live-stock interests, machine shops, flouring mills, planing mills, breweries, mattress and incubator factories, etc The city is the seat of the Fremont normal school, and contains a Carnegie library, orphans home (Lutheran), and fine courthouse and high-school buildings Settled in 1857, Fremont was incorporated in 1871 and is governed under a revised charter of 1901, which provides for a mayor, chosen every two years, and a city council, two of whose members are elected from each ward The city owns and operates its water works and electric-light plant Pop, 1900, 7241, 1910, 8718, 1914 (U S est), 9345

FREMONT A city and the county seat of Sandusky Co, Ohio, 30 miles by rail southeast of Toledo, on the Sandusky River, and on the Lake Shore and Michigan Southern, the Lake Erie and Western, the Lake Shore Electric, and the Wheeling and Lake Erie railroads (Map Ohio, D 3) The city is at the head of steam navigation on the river, is the centre of a fertile agricultural region and of productive oil and natural-gas fields, and has manufactures of electrocarbons, engines and boilers, agricultural implements, shears, cutlery, stoves and ranges, flour, paper, underwear, beet sugar, sash, doors, and blinds, etc Ample water power is furnished by a large dam and power plant at this place There are several public parks, a State historical building, and the Birchard Public Library, founded and endowed in 1873 by Sardis Birchard, uncle of ex-President Hayes Spiegel Grove, the home of ex-President Hayes, is still occupied by his heirs Pop, 1900, 8439, 1910 9939 1914 (U S est), 10,392, 1920, 12,468 A trading post, probably temporary, was established here in 1785, and a fort, called Fort Stephenson, was erected early in 1812 A popular rendezvous of the Indian tribes, Fremont was known as Lower Sandusky until 1850, when its present name was adopted in honor of J C Frémont On Aug. 2, 1813, Major George Groghan, with 150 men, was attacked here by General Proctor at the head of 400 English and 300 Indians The latter were repulsed with the loss of 94 killed and wounded, while of the Americans only one man was killed and seven wounded Consult Howe, *Historical Collections of Ohio* (3 vols, Columbus, 1889–91)

FRÉMONT, JOHN CHARLES (1813–90) A distinguished American explorer and soldier, son of a Frenchman of the same name and Anne Whiting, a daughter of a distinguished Virginia family, the divorced wife of John Pryor He was born in Savannah, Ga, Jan 21, 1813, and was educated in Charleston College, from which he was expelled for insubordination, but which later (1836) conferred upon him the degrees of A B and A M In 1833 he went for about three years as teacher of mathematics on the South American cruise of the United States sloop of war *Natchez* On returning he passed the examination for regular professor of mathematics in the navy, but instead of following this he joined a railway survey party In 1837 he assisted in another railway survey and, that winter, in the survey of the Cherokee lands in parts of Georgia, North Carolina, and Tennessee This was the beginning of his work as an explorer He was next appointed to assist J N Nicollet (q v) in the survey of what is now Nebraska, Dakota, Minnesota, and Iowa, which occupied the seasons of 1838 and 1839 During the 1838 absence he was made a second lieutenant in the Topographical Corps, U S A While preparing the maps in Washington, in 1841, he met and eloped with Jessie Benton, daughter of Senator Benton, returning to the Benton home after the marriage ceremony, which was performed by a Catholic priest

Nicollet was expected to conduct a further exploration into the West with Frémont as chief assistant, but, his health failing, the proposed expedition was placed in charge of Frémont The order issued for him was to proceed to the frontier beyond the Mississippi, but this did not satisfy him, and he had it changed to extend as far as South Pass in the Rocky Mountains This was all done by the influence of Thomas H Benton (q v), the real power behind the plan, and it was the first of a series of scientific examinations of what is now the western domain of the United States—the Oregon part then contested by Great Britain, and the California and New Mexican part belonging to Mexico On the first, or 1842, expedition Frémont had 21 men The route was practically that of the already established Oregon Trail of the emigrants, from Westport (Kansas City) to and up the North Platte and the Sweetwater through South Pass, where a turn was made to the north and a high mountain (13,790 feet) of the Wind River Range, since known as Frémont Peak, was climbed The second, or 1843, expedition was projected on his return, to connect the 1842 work with that done on the Pacific coast by Captain Wilkes, U S N On the second expedition he had 39 men Barely had he reached Westport when an order arrived at St Louis commanding his return because, without authority, he was taking a twelve-pounder howitzer His wife, receiving the order in St Louis, did not forward it, but, instead, sent a swift messenger telling him to get into the wilderness as quickly as possible and ask no questions By the Smoky Hill Fork, the Cache

à la Poudre, the head of the Medicine Bow, and the Sweetwater he again reached South Pass, thence went to Great Salt Lake via Bear River, and navigated a rubber boat to the island which now bears his name Thence by Snake River valley and the Columbia he reached Fort Vancouver, where he connected with the Wilkes survey Instead of coming home by the way he had gone, he swung south into the Territory of Mexico and struggled through the western part of the desert region he named the Great Basin, in search of a mythical river called the Buenaventura, in which there was still a belief, although Jedediah S Smith and Joseph Walker, who had previously crossed the basin from west to east and east to west, had not found it Frémont was the first to inspect the region scientifically, and much of the way he traversed original ground Discovering and naming Pyramid Lake, he proceeded south to what is now Walker River, where he concluded to strike west for Sutter's Fort, and accordingly crossed the Sierra Nevada, by Carson Pass, in January and February, 1844, reaching Sutter's on March 5

From this place he continued south up the San Joaquin valley, recrossed the Sierra by Tehachapi Pass, went to the Mohave River, then to the Virgin via Las Vegas, Nevada, and up that stream to the west foot of the Wasatch, which he followed to Utah Lake Thence he struck east, via Uinta River and Brown's Park, to the North Platte and turned south through the Parks of Colorado to the Arkansas, which he followed eastward, arriving in St Louis, Aug 6, 1844, and a few weeks later in Washington His report created a sensation, and Congress ordered 10,000 copies printed for distribution Numerous publishers reprinted it in their own editions, one reaching a sale of more than 20,000 copies He was appointed captain by brevet, July 31, 1844

The Mexican War was now imminent and Frémont's third, or 1845, expedition, speedily organized, has a vital bearing on the acquisition of California From Bent's Fort on the Arkansas, which was left Aug 16, 1845, Frémont had a force of 60 well-equipped marksmen, to whom prizes were offered for every increase of skill They proceeded by the Arkansas, the Grand, and the Uinta to the Wasatch Mountains, and across them to Utah and Salt Lakes Thence they went down the Humboldt, which Frémont named at this time, to the Sierra Nevada, where they crossed by what is now Donner Pass, descending to Sutter's Fort Frémont asked permission of the Mexican officials at Monterey to continue his explorations in their country At first this was granted, then rescinded, and he was commanded to depart Instead of doing so he fortified himself, March 5, 1846, on a small mountain about 30 miles from Monterey, called Gavilan (Hawk's) Peak This was in reality the first step in the Mexican War in California He presently changed his mind about resisting and retreated towards Oregon Near Klamath Lake, May 9, 1846, he was overtaken by Lieutenant Gillespie, U. S. N, a special messenger from Washington, who had come incognito through Mexico with secret instructions for the American Consul and also for Frémont, but over the exact nature of the latter there has been much controversy. Frémont returned immediately to the lower Sacramento valley

The American settlers of this locality were in a state of excitement over threats of expulsion by Mexican officials, and they finally openly revolted by seizing some government horses Next, the town of Sonoma was captured, and a white flag, with one red stripe at the bottom and a large star and bear for emblems, was raised over the town proclaiming the "Republic of California," these words being inscribed on the flag From this the affair received the name of "The Bear Flag Revolt" It was the second step towards the acquisition of California Captain Frémont, U S A, now took command, thus creating an American military occupation and rendering it impossible for any other nation peacefully to make such a move, if, as was claimed, there was this intention Rumors of the expected beginning of hostilities with Mexico on the Rio Grande came, and finally definite news, but Commodore Sloat in command of the United States fleet was slow to act At last he raised the flag at Monterey, and soon after Commodore Stockton assumed chief command and actively cooperated with Frémont and Gillespie, the latter having remained as aid to Fremont The flag of the United States was raised at San Francisco, Sonoma, and Sutter's Fort Stockton appointed Frémont major of the land forces, which Stockton considered in the nature of marines

When Los Angeles was taken, Gillespie was put in command of the town, but his methods caused a revolt, and the war broke out afresh just as General Kearny, U S A, arrived overland from New Mexico Kearny cooperated with Stockton and Frémont, but the question of superior authority between him and Stockton was a source of friction Frémont continued to recognize Stockton as his superior officer Frémont's commission as lieutenant colonel of a rifle corps now arrived from Washington Los Angeles was again captured, the war was over, and Stockton appointed Colonel Frémont Governor—a position he held 50 days in defiance of General Kearny's contrary orders For this and other refusals to acknowledge the official supremacy of Kearny over Stockton, Frémont was tried by court-martial in Washington, on charges of mutiny, disobedience, and conduct to the prejudice of good order and military discipline Kearny himself made only one charge—mutiny The trial lasted from Nov 2, 1847, to Jan 31, 1848 Frémont was judged guilty and sentenced to dismissal from the service President Polk refused to confirm the mutiny charge, but approved the verdict on the others, immediately remitting the sentence Frémont resigned, feeling that he had been deeply wronged The resignation took effect March 15, 1848

In October, 1848, with a party numbering 33, Frémont started on his fourth expedition, to survey a railway route to the Pacific. They attempted to cross the San Juan Mountains of Colorado, at the head of the Rio Grande, in the middle of winter, as Frémont wished to determine how much of an obstacle the snow would be to railway operation After passing the crest it was impossible to go on because of storm and snow, and the party retreated to the Rio Grande in the San Luis valley Eleven of the men died from lack of food and from exposure before Taos was reached There a fresh start was made, and California was gained by a far southern route, down the Rio Grande and south of the Gila to the 110th meridian at about 31° 6′, where a north course through Tucson was followed to

the Gila and then that stream west Frémont arrived in Sacramento in the spring of 1849

In 1847 he had purchased a large land grant known as the "Mariposas," and now, finding gold mines upon it, he began to develop them The story of this "Mariposa Grant" is a long one, full of complications Frémont's title was reversed after being confirmed, but was finally definitely confirmed by the United States Supreme Court Mortgage and litigation ensued, and at last he lost the property altogether In 1850 he was elected one of the first two senators from California and repaired to Washington, taking his seat in September of that year The new senators drew for the necessary short term, and it fell to Fremont He went to California between sessions and did not get back to finish the term Failing of reelection, his senatorial career ended About this time he received a gold medal from the King of Prussia, and the Founder's medal from the Royal Geographical Society While in London in 1852 he was arrested and put in jail for unpaid bills connected with the conduct of the California revolt —bills that should have been paid by Congress In 1853, still faithful to his "central route to the Pacific," he organized his fifth and last expedition, with 22 persons, 10 of them Delawares Leaving his fourth route in the San Juan Mountains to his left, he passed over into Grand River valley (following Gunnison and Heap as far as Green River), crossed the Green at the San Rafael, touched the head of Frémont River, and went through Grass valley and Fremont Pass to the pioneer settlement of Parowan, where the party arrived in an exhausted state, one man, Oliver Fuller, dying the last day before reaching the settlement From Parowan he continued almost due west across the desert Great Basin to the Sierra Nevada and there turned south along its foot to a pass near Walker Pass, where he went over to the San Joaquin valley Little was accomplished by the fourth and fifth expeditions, which were financed by himself and Senator Benton.

In 1856 the new Republican party nominated Fremont as its first candidate for the presidency His nomination was due to his availability, to renown gained by his explorations, and to his known opposition to the extension of slavery On account of this attitude towards slavery, however, the entire South opposed him as well as large numbers of Northern voters who still wished to let slavery alone He was defeated, receiving 114 electoral votes to 174 cast for Buchanan Had he been elected, the War of the Rebellion would have come then, or perhaps not at all, for he did not intend to disturb existing conditions of slavery, only to prevent extension of it into the new territory Abraham Lincoln "took the stump" in his behalf

Soon after the outbreak of the Civil War Fremont, through the efforts of his then friends, the Blairs, was appointed a major general and placed in command of the Western Department, with headquarters at St Louis, where, Aug 30, 1861, he issued a proclamation "The property, real and personal, of all persons in the State of Missouri who shall take up arms against the United States, or who shall be directly proven to have taken an active part with their enemies in the field, is declared to be confiscated to the public use, and their slaves, if any they have, are hereby declared freemen" He established a bureau of abolition to carry out the order respecting manumission. He contended that captured slaves of enemies of the Union were automatically freed, as the government could not reenslave them His action in this respect was considered premature by Lincoln, who was obliged to annul it, which he did September 11 Charges of incompetence and extravagance were made against Frémont, who was full of large plans Such charges were common at the time, and politics played a large part in the assignment of commands and the making of generals, so that all that is said against Frémont must be accepted with caution The echoes of the 1856 campaign were also still in the air Frémont was removed from the Missouri field and a few months later given command of the Mountain Department of Virginia, Tennessee, and Kentucky The continued direction of operations from Washington was against military cohesion in the field, and nothing went right The troops were ill armed, ill fed, and ill managed The divisions were finally consolidated under General Pope, who was Frémont's junior in rank, and Frémont declined to serve under him Frémont retired from that field and was not appointed to another command In 1864 he resigned

May 31, 1864, he was nominated by a small faction of the Republican party for president, but the support was so slender that he soon withdrew Being still deeply interested in the subject of a Pacific railway, he became involved in railway construction, which the financial disasters of 1873 brought down in ruin upon his head He was prosecuted by the French government for alleged participation in swindles connected with the projected transcontinental line and was sentenced on default to fine and imprisonment From 1878 to 1882 he was Governor of Arizona In 1890, then 77 years old, he was appointed a major general on the retired list by Act of Congress, and July 13 of that year he died in New York of ptomaine poisoning. He was buried in Rockland Cemetery, Piermont, N Y., on the west side of the Hudson, 500 feet above the river and only a few yards from the brink of the mountain A monument was erected at his grave in 1906 by the State of New York. His wife and his son Charles are buried beside him

Consult J C Frémont, *Report of the Exploring Expedition to the Rocky Mountains in the Year 1842, and to Oregon and North California in the Years 1843–44* (Washington, 1845), Frémont, *Memoirs of my Life* (Chicago, 1887), one volume only published, J B Frémont, *Souvenirs of my Time* (Boston, 1887), id, *A Year of American Travel* (New York, 1878), id, *The Story of the Guard* (Boston, 1863), John Bigelow, *Memoir of the Life and Public Services of John Charles Frémont* (New York, 1856), S N. Carvalho, *Incidents of Travel and Adventure in the Far West with Col Frémont's Last Expedition* (ib, 1857), Micajah McGehee, "Rough Times in Rough Places," *Century Magazine*, vol xix, N S, ib, 1890–91); E B. Frémont, *Recollections* (ib, 1912), Josiah Royce, *California* (Boston, 1888), I B Richman, *California under Spain and Mexico* (ib, 1911), F S Dellenbaugh, *Frémont and '49* (New York, 1914), Nicolay and Hay, *Abraham Lincoln A History*, vol iv (ib, 1890), Upham, *Life of Frémont* (Boston, 1856), Curtis, *The Republican Party*, vol i (New York, 1904)

FREM'STAD, OLIVE (c1870–) An American dramatic soprano, one of the world's greatest interpreters of Wagner's heroines She was born at Stockholm, Sweden, about the year 1870, but received her early education and musical training in Christiania When she was 12 years of age her parents removed to America, settling in Minneapolis Even before leaving Christiania her progress on the piano had been such that she had appeared as an infant prodigy When 16 she gave piano lessons and sang in chorus In 1890 she came to New York, where she continued to give instruction on the piano and sang in various choirs At the same time she had her voice cultivated by E F Bristol, for whom she played accompaniments, as well as for other vocal teachers After she had made her début as a concert singer, in Boston under Zerrahn and in New York under Seidl, in 1892, she went to Germany and studied for two years with Lilli Lehmann in Berlin In 1895 she made her operatic début as Azucena in *Trovatore* at Cologne The following year she attracted the attention of Madame Wagner through her excellent work as one of the Rhine maidens at Bayreuth In 1897–99 she was a member of the Cologne Opera, but she also was heard in Vienna, Amsterdam, and Antwerp. In 1900 she accepted an engagement for three years at the Royal Opera in Munich, during which time she likewise sang two seasons at Covent Garden, London Her engagement for the Metropolitan Opera House, in 1903, marks a turning point in her career On November 25 of that year she made her American début as Sieglinde with overwhelming success Before long she was idolized by the public, and when, in the course of time, she had appeared in all the great Wagnerian rôles (including Kundry), it was generally admitted that her interpretations had never been surpassed For 11 consecutive seasons, until 1914, she was one of the greatest stars of the Metropolitan company Both in New York and Paris she created the part of Salome in Strauss's opera As a lieder singer also she must be ranked with the world's finest artists For her achievements she was twice decorated by the French government

FRÉMY, frā'mē', EDMOND (1814–94). A French chemist, born in Versailles He became professor of chemistry at the Ecole Polytechnique, Paris, in 1846 In 1850 he was made professor of chemistry at the Muséum d'Histoire Naturelle He acted as director of the Muséum from 1879 to 1881 Frémy's researches extended to almost every branch of chemistry In addition to numerous papers in the *Annales de chimie et de physique,* he published *Traité de chimie générale* (7 vols, 3d ed, 1862–65). The *Encyclopédie Chimique,* a work in 10 volumes, upon which he was engaged for 13 years, was prepared by him in collaboration with several distinguished scientists, and was completed in 1894

FREMYOT, J. F, BARONESS DE See CHANTAL.

FRENCH, ALICE (1850–) An American novelist, better known as OCTAVE THANET She was born at Andover, Mass, and began her literary career, about 1878, with studies of a social and economic bent, but soon turned to short stories, in which she achieved much success, especially after her removal to the West Iowa and Arkansas gave her opportunities for exploiting regions hitherto little attempted in fiction. Noteworthy among her books are *The Bishop's Vagabond* (1884), *Knitters in the Sun* (1887), *Otto the Knight* (1893), *A Book of True Lovers* (1898), *The Man of the Hour* (1905), *Stories That End Well* (1911), *A Step on the Stair* (1913) Her novel *Expiation* (1890), won, and deserved, high praise "Octave Thanet" also edited *The Best Letters of Mary Wortley Montagu*

FRENCH, ANNE WARNER See WARNER

FRENCH, DANIEL CHESTER (1850–) An eminent American sculptor He was born at Exeter, N H, April 20, 1850, and in 1867 his father, a judge in the New Hampshire courts, moved to Concord, Mass He studied for a year at the Massachusetts Institute of Technology attended Dr Rimmer's lectures on anatomy at Boston, and in 1869 worked for a short time in the studio of J Q A. Ward In 1873 he made for the town of Concord the earliest and one of the cleverest of his more important works, the "Minute Man," and upon its completion went to Florence, where he spent a year with the American sculptor Thomas Ball In 1876 French opened a studio in Washington, from 1878 to 1887 he made Boston and Concord his headquarters, and in the latter year settled in New York Meanwhile he had made frequent visits to Paris, but although he absorbed whatever appealed to him most, he does not seem to have come directly under the influence of any one French master. His genius is peculiarly American, and combines singular beauty of technique with poetry, grace, and plastic charm The sculptural compactness of his groups and the play of light and shade are particularly admirable

French is a sculptor of great versatility, and the catalogue of his works is large His "John Harvard" (1882), Cambridge, Mass, is in the severe, simple style of the "Minute Man" His busts of Emerson and Alcott are in the firm, close modeling of his earlier years, and are characterized by the lofty intellectual quality which he so often shows in his portraitures The marble statue of Lewis Cass in the rotunda of the capitol (1888) in Washington is more loosely handled than the two former works, but is large and strong In the Gallaudet Monument in Washington, French first introduces the element of pathos which has become so familiar in his later works Perhaps the most interesting is his relief, "Death and the Sculptor," for the tomb of the sculptor Martin Milmore in Forest Hills Cemetery, Boston, which received a medal of honor at Paris in 1900 Of the large amount of decorative sculpture which was done by French, or under his direction, at the World's Fair of Chicago in 1893, the most noteworthy were the many groups with animals, done in collaboration with Edward Potter, his former pupil, who later modeled the horses for his equestrian statues The great gilded statue of the Republic, which French placed in the Court of Honor, is one of the most striking colossal statues of recent times His other work includes the monument to John Boyle O'Reilly in the Back Bay Fens of Boston (1895), the statues of Starr King in San Francisco (1890) and of Rufus Choate (1898) in Boston, and the two fine statues, "History" and "Herodotus," for the Congressional Library in Washington With the assistance of Potter he modeled the bronze equestrian statue of General Grant, in Fairmount Park, Philadelphia (1899); that of General Washington (1900), presented by an association of American women to the French nation, and

now in the Place d'Jéna, Paris, and that of Gen Joseph Hooker, State House Grounds, Boston (1903) Other important works are the Hunt Memorial in Central Park, New York, "Alma Mater" (1903), in front of Columbia University Library, the fine bronze doors of the Boston Public Library, in low relief, completed in 1904, four groups of the "Continents" for the New York customhouse, of which the models were completed in 1906 His more recent works include the impression of the Alice Freeman Palmer Memorial at Wellesley College (1909), a "Mourning Victory" for the Melvin Memorial, Sleepy Hollow Cemetery, Concord, Mass. (1910), the statue of General Oglethorpe, Savannah, Ga (1910), Marshall Field Memorial, Graceland Cemetery, Chicago (1911), the seated figure of Emerson, Concord Library (1912), a statue of Lincoln for Lincoln, Neb (1912) A still more recent commission is the memorial of Andrew H Green for Central Park, New York He received numerous distinctions, being elected a member of the National Academy of Design, of the American Academy of Arts and Letters, and of the Accademia di San Luca, Rome, and honorary president of the National Sculpture Society Consult Caffin, *American Masters of Sculpture* (New York, 1903), Taft, *History of American Sculpture* (ib, 1903), Coughlan, in *Magazine of Art* (1901), Caffin, in *International Studio*, vols xx (1903), lx (1910), and lxvi (1912)

FRENCH, Sir John Denton Pinkstone (1852–1925). A British soldier, born at Ripple Vale, Ripple, Kent He served in the royal navy in 1866–70, entered the army in 1874, served with the Nineteenth Hussars in the Sudan campaign of 1884–85, and commanded that regiment in 1889–93 From 1893 to 1894 he was assistant adjutant general of cavalry on the staff, and from 1895 to 1897 was assistant adjutant general at army headquarters He was promoted to the command of the Second Cavalry Brigade in 1897, and appointed major general in command of the cavalry division in Natal in 1899. In 1900 he became lieutenant general (local) commanding the cavalry division in South Africa He directed the operations about Colesberg (Nov 10, 1899, to Jan 31, 1900), was in command of the cavalry in the operations terminating in the relief of Kimberley (February, 1900), and of the cavalry division of Lord Roberts's army in the operations leading to the capture of Bloemfontein and Pretoria He also commanded Lord Roberts's left wing in the various battles east of Pretoria. For his services he was promoted to be lieutenant general and appointed to the command of the First Army Corps at Aldershot. He became general in 1907, was inspector general of home forces in 1907–11, and was made field marshal in 1913. In March, 1914, during the controversy between Asquith's cabinet and the army over the army's service in Ulster, French resigned, but on the outbreak of war later in the year he reentered the army and commanded the English expeditionary force in France See War in Europe

FRENCH, Mansfield (1810–76). An American educator, born at Manchester, Vt, and educated at Burlington (Vt) Seminary and at the Divinity School of Kenyon College, Ohio. He was one of the founders of Marietta College, in 1835 In 1845 he joined the Methodist Episcopal church, and from 1845 to 1848 he was president of the Xenia (Ohio) Female College He worked for the founding of Wilberforce University, the first college for negroes in America In 1858 he became editor of a religious paper, *The Beauty of Holiness* He was an ardent Abolitionist, and at the outbreak of the Civil War made a study of the negro question with a view to preparing for the emancipation of the slaves In February, 1862, at an immense mass meeting in Cooper Union, New York City, his plans were explained and the National Freedmen's Relief Association was organized He became its general agent and carried on its work at Port Royal, S C, where, in spite of opposition from both civil and military authorities, his work among the negroes met with considerable success

FRENCH, William Henry (1815–81) An American soldier He was born in Baltimore, Md, graduated at West Point in 1837, was assigned as second lieutenant to the First Artillery, served in the Florida War of 1837–38, and was engaged on frontier duty until 1847 In the Mexican War he served in the Southern campaign On Sept 22, 1848, he was promoted to be captain, and between this time and 1861 was stationed successively at Fort Monroe, Fort McHenry, Fort Clark (Tex), and Fort Duncan (Tex) In September, 1861, he was promoted brigadier general of volunteers, and, in October, to be a major in the Second Artillery He served throughout the Peninsular campaign, earning the brevet of lieutenant colonel, participated in the Maryland campaign and earned the brevet of colonel, was promoted to be major general of volunteers in November, 1862, served in the battles of Fredericksburg and Chancellorsville, and subsequently commanded the Third Army Corps in various minor engagements On May 6, 1864, he was mustered out of the volunteer service, and on March 13, 1865, was brevetted major general in the regular army He was promoted colonel in July, 1877, was in command of the troops engaged in the suppression of the Baltimore and Ohio Railroad riots, July 18–24, 1877, and on July 1, 1880, was retired from active service

FRENCH, William Merchant Richardson (1843–1914) A prominent figure in the development of the Art Institute of Chicago He was born at Exeter, N H, and graduated from Harvard College in 1864 His first occupations were landscape gardening and civil engineering, but he was early interested in art, and by 1874 was sought after as a lecturer on art and as a writer for the reviews In 1878 he went to Chicago to become secretary of the Chicago Academy of Design, which after various changes became the Art Institute of Chicago With Charles L Hutchinson he worked—at first for a salary far smaller than he would have earned in other pursuits—to build up the institution to its present great size and prominence, continuing in its service till his death He was one of the founders of the American Association of Museums

FRENCH AND INDIAN WAR The name usually given to the struggle in America between the French and English (1754–60), roughly coincident with the Seven Years' War in Europe The French, being in possession of Canada and Louisiana, reenforced their establishments on the banks of the St. Lawrence and near the mouth of the Mississippi, and attempted, by the occupation of various points in the interior with a line of military posts and of protected trading posts, to confine the English

to a strip of territory on the Atlantic coast, while they themselves planned to occupy both the land of the Ohio basin and that surrounding the Great Lakes The territory in dispute, and especially that watered by the Ohio, was claimed by both France and England, the French resting their claims largely upon the alleged effect on the ownership of an entire river basin of a settlement at the river's mouth, and the English insisting that their King's grants of land "from sea to sea" became literally effective and valid when the coast line was permanently occupied No permanent settlements had been made in the territory thus claimed by both, although a small settlement of Virginians was established on the Monongahela and settlements in Ohio were in contemplation The Governor of Virginia had organized a provincial force to protect the western frontier, and hostilities began in May, 1754, with an attack made by Washington on a French force under Jumonville In 1755 an army of regulars, under General Braddock, acting with a detachment of Virginia troops, undertook an expedition for the capture of Fort Duquesne, which the French had built at the junction of the Monongahela and the Allegheny This force was disastrously defeated July 9, 1755, and the French retained full control of the frontier Being enabled to operate on an "inner line" of communication, while the English were obliged to conduct a series of isolated and unrelated campaigns, the French maintained their advantage until the summer of 1758, when they inflicted a great defeat upon the British in the battle of Ticonderoga, July 8, their last important success The fortune of war now turned Largely as a result of a more energetic policy introduced by the Pitt administration, the English campaigns were prosecuted more vigorously and resulted in the capture of Louisburg (July, 1758), of Fort Frontenac, on Lake Ontario (August, 1758), and of Fort Duquesne (November, 1758) The French line of defense and of communication was thus broken, and this success was made secure in the following summer by the capture of Ticonderoga, Crown Point, and Fort Niagara Finally, on Sept. 13, 1759, the forces of General Wolfe defeated the army of Montcalm which was defending Quebec, whose surrender followed, and in September, 1760, control was gained of Montreal and the rest of Canada Peace was not made until the Seven Years' War (q v) on the Continent was concluded, and in the Treaty of Paris, of 1763, France ceded Canada to England, and England received from Spain the Floridas, which she retained until 1783, while Spain received Louisiana from France Thus France lost her possessions in America Consult Winsor, *The Mississippi Basin* (Boston, 1895), Parkman, *Montcalm and Wolfe* (ib, 1884), Sargent, *History of an Expedition against Fort Duquesne, 1775*, edited from original manuscripts (Philadelphia, 1856), Doughty and Parmlee, *The Siege of Quebec and the Battle of the Plains of Abraham* (6 vols., Quebec, 1901), Bradley, *Fight with France for North America* (New York, 1902), Thwaites, *France in America* (ib, 1905), Wood, *The Fight for Canada* (Boston, 1906), Willson, *Life and Letters of James Wolfe* (New York, 1910)

FRENCH ART. See GOTHIC ART, BARBIZON, THE PAINTERS OF, IMPRESSIONIST SCHOOL OF PAINTING; PAINTING, LANDSCAPE PAINTING; SCULPTURE.

FRENCH BROAD A river rising in the Blue Ridge Mountains, in Transylvania Co, western North Carolina (Map North Carolina, B 4) It flows northeast into Henderson County, then north to Asheville, then northwest and west to its confluence with the Holston River, about 4 miles west of Knoxville, Tenn, the two streams forming the Tennessee River (q v)

FRENCH CHALK See CRAYON, TALC

FRENCH CONGO See FRENCH EQUATORIAL AFRICA

FRENCH CREEK A stream in Jefferson Co, N Y, emptying into the St Lawrence On Nov 1 and 2, 1813, a small American force, under General Brown, intrenched on its banks near the site of the present Clayton, N. Y, repelled, with the loss of only two men killed and four wounded, an attack of 12 British vessels, which suffered severely in the engagement

FRENCH EAST INDIA COMPANY See EAST INDIA COMPANY

FRENCH EQUATORIAL AFRICA, prior to January, 1910, FRENCH CONGO A French government-general in west central Africa, consisting of the Gabun Colony, the Middle Congo Colony, and the Ubangi-Shari Colony, to which is attached the Military Territory of the Chad (Map Africa, F 4 and 5) The irregularity of the country's outline was increased by the cession (Nov 4, 1911) to Germany of about 280,000 square kilometers, carrying an estimated population of 1,000,000 By the accession of this territory to the German Kamerun, the latter now divides French Equatorial Africa at two points, reaching the rivers Congo and Ubangi The government-general extends from the Atlantic between Kamerun, on the north, and the Congo district of Angola and Belgian Congo, on the south, east to the Congo and Kandeko rivers, the Congo River separating it from the Belgian Congo and the Kandeko from the southeastern arm of Kamerun (which embraces the valley of the Sanga), thence it extends northeast and north to the Sahara, Kamerun and the Military Territory of the Niger being on the west and Belgian Congo and the Anglo-Egyptian Sudan (including Darfur) on the east The northern part of the government-general, i e, the Military Territory of the Chad, thus includes the native states of Bagirmi, Kanem, and Wadai North of the confluence of the Ubangi and Congo the latter river forms the boundary with Belgian Congo The estimated area of French Equatorial Africa, subsequent to the boundary change of 1911, is 1,439,000 square kilometers (555,598 square miles), and the estimated population 9,800,000 The coast is diversified by several bays and many lagoons The interior is but partly explored It is mountainous in the south, with elevations reaching 3600 feet, the river valleys are numerous, extensive, and very fertile The Gabun, Ogowe, and Kwilu are among the important rivers The fauna includes the buffalo, leopard, rhinoceros, and crocodile, and the home of the chimpanzee and gorilla is found here The climate is unhealthful for Europeans The forests are valuable, and rubber is a prominent product There are mineral resources of gold, iron, and copper Manioc is raised by the natives, and coffee, vanilla, cacao, etc, are grown by Europeans The exports are chiefly rubber, ivory, and costly woods Some of the other exports are coffee,

cacao, palm kernels, palm oil, and piassava The general commerce increased from 10,496,000 francs for imports and 7,539,000 francs for exports in 1900 to 13,191,000 and 24,631,000 respectively in 1910 and 19,987,000 and 28,-035,000 in 1912 In the latter year, imports from France were valued at 8,320,000 francs, and exports to France at 12,855,000 In 1911 there entered 124 vessels, of 282,657 tons

French Equatorial Africa is administered by a governor-general, who is assisted by a secretary-general and a council of government There is a general budget, and also separate budgets for the constituent colonies Each of the three colonies has a lieutenant governor and an administrative council The capital of Gabun is Libreville (pop, about 1500), of Middle Congo, Brazzaville (5000), on Stanley Pool, opposite the Belgian Congo town of Leopoldville, of Ubangi-Shari, Bangi The local budget of the government-general for 1911 balanced at 15,-263,000 francs, this does not include the French subvention, which for 1914 was estimated at 10,420,500 francs. Public debt, Jan 1, 1912, 14,784,000 francs Towns of importance besides those mentioned above are Franceville, Fort-de-Possel, and the ports Cape Lopez and Loango The transportation and communication facilities are very meagre The inhabitants include the Fan, Bakalai, Mpongwe, and several other important and interesting races or tribes

The coast of French Equatorial Africa was discovered by the Portuguese in 1470 In 1841 the French established a footing on the Gabun River and actively began operations Libreville was founded in 1849 In 1862 Cape Lopez was acquired and the French were then in possession of the coast for 200 miles Explorations and military expeditions extended the French rule northeast until, by a series of conventions (1885–87) with European Powers, the limits of French Equatorial Africa were fixed Up to 1894 continual encroachments were being made by the Congo Free State (now Belgian Congo), Great Britain, and France A convention held in that year made a compromise boundary By treaties with Great Britain in 1899, with Spain in 1900, and Germany in 1908, the boundaries which exist to-day were definitely surveyed and determined upon. Consult Payeur-Didelot, *Trente mois au continent mystérieux, Gabon-Congo*, etc (Paris, 1900), Lorin, *Le Congo français et le régime des concessions* (ib, 1902), Cuvillier-Fleury, *La mise en valeur du Congo français* (ib, 1904), Terrail, *La chronique de l'an 1911 les négociations à propos du Maroc et du Congo* (ib, 1912)

FRENCH ESTABLISHMENTS IN INDIA. The French colonies of Pondicherry, Chandernagore, Karikal, Mahé, and Yanam (qq v) in India French India has a total area of 509 square kilometers (197 square miles) and a population, according to the 1911 census, of 282,379 The estimated population in 1913 was 273,000 Imports and exports (general trade) increased from 4,038,000 and 10,722,000 francs respectively in 1900 to 8,377,000 and 37,466,000 in 1910 and 9,032,000 and 37,218,000 in 1912

FRENCH ESTABLISHMENTS IN OCEANIA. A French colony composed of widely scattered islands in the South Pacific The estimated area is 4395 square kilometers (1697 square miles), and the population in 1911 was returned at 31,477, divided as follows Society Islands, including Tahiti, Iles-sous-le-Vent, etc, 1650 square kilometers and 21,543 inhabitants· Marquesas Islands, 1274 and 3117, Tuamotu Islands, 860 and 3715, Gambier Islands, 30 and 529, Tubuai Islands, 579 and 2573 The capital is Papeete (about 3600 inhabitants), in Tahiti, the principal island Total imports and exports were valued at 3,873,000 and 3,507,000 francs respectively in 1890, in 1900, 3,484,000 and 3,549,000, in 1910, 5,569,000 and 6,031,000, in 1912, 7,747,000 and 8,840,000

FRENCH FURY, The A name given to the attack made by the Duke of Anjou on Antwerp on Jan 17, 1583 The attempt was repelled and all of the assaulting force were killed or captured

FRENCH GOLD See OROIDE

FRENCH GUIANA See GUIANA

FRENCH GUINEA, gĭn'ē A colony forming part of French West Africa It is bounded on the northwest by Portuguese Guinea, on the north by the French colonies of Senegal and Upper Senegal and Niger, on the east by Upper Senegal and Niger and the French colony of the Ivory Coast, on the south by Liberia and Sierra Leone, and on the southwest by the Atlantic Ocean (Map Africa, C 3) French Guinea includes the region of Futa Jallon (q v), the circle of Dinguiray in the middle of the colony, and in the east the circles of Siguiri, Kurussa, Kankan, Kissidugu, and Beyla Part of the eastern boundary is formed by the river Sankarani The estimated area is 239,000 square kilometers (92,278 square miles) The coastal zone reaches inland to a line varying from 25 to 60 miles from the sea, and is succeeded by a series of abrupt terraces, which are believed to mark the ancient seacoast Some of the rivers which descend from the mountains of Futa Jallon spread out, upon reaching the coastal zone, into numerous branches forming a sort of network of canals The alluvial soil of the region is particularly fertile and carries a luxuriant vegetation Sandy plateaus upon a granite substratum stretch eastward to the mountainous region of Futa Jallon, in which are the water partings of the Senegal, Gambia, and Niger rivers The eastern circles, attached to the colony in 1899, are lower and less rugged In French Guinea, rubber, palm kernels, and gums are gathered, and the cultivated crops include millet, rice, sesame, manioc, etc Cattle raising is practiced on a large scale by the Fulah of Futa Jallon Little is definitely known of the mineral resources Native manufactures include apparel, rush mats, pottery, dressed leather, weapons, and jewelry Total imports and exports increased from 12,442,000 and 10,088,000 francs respectively in 1900 to 29,563,000 and 18,306,000 in 1910 and 19,274,000 and 20,058,000 in 1912 The principal export is rubber French, English, and German steamers regularly visit Konakry, where there is a jetty over 1000 feet long A railway to connect Konakry with Kankan was opened in January, 1911, as far as Kurussa, on the Niger (588 kilometers, 365 miles) An extension from Kurussa to Kankan (74 kilometers, 46 miles) was to be opened to traffic in 1914

French Guinea comprises the Commune of Konakry (which includes the Los Islands), 21 administrative circles, and, in the southeast, a military territory The capital is Konakry, where resides the lieutenant governor, representing the governor-general of French West Africa The lieutenant governor is assisted by

a secretary-general and by an administrative council composed of six members, three chosen from the government officials and three from prominent inhabitants

The population of French Guinea as estimated in 1911 was 1,927,000 In 1914 an official publication enumerated the African races, with a total of 1,809,000 persons The French numbered about 1100, and other Europeans less than 100 The principal towns are Konakry (occupying Tumbo Island and connected by bridge with the mainland), with 7100 inhabitants, Kankan, a commercial centre, with 7200, Boke, 4400, Kurussa, 5900, Forecariah, 4600, Kindia, 2300, Dubreka, 1200 The natives comprise several more or less mixed races, the most numerous of which is the Fulah The Fulah of French Guinea are descended from pastoral nomads who came to Futa Jallon towards the end of the sixteenth century They are good herdsmen, but disdain agriculture They are fervent propagandists of Islam and are socially organized under a head (almamy) exercising spiritual and limited temporal power The Fulah number about 684,000 The Susu, or Jallonke, are generally supposed to have been driven out of Futa Jallon by the Fulah They now dwell principally in the region between Futa Jallon and the coast In intelligence they are much superior to the coastal indigenes For the most part they are fetishistic, though sometimes classified as Mohammedan, Islam is making rapid progress among them They number about 315,000 The Malinke occupy the colony from Futa Jallon eastward Though less intelligent than the Fulah, they show marked aptitude for agriculture and commerce Though largely Mohammedan, they are still given to fetishistic practices They number about 567,000 Grouped with the Malinke are the warlike Coniagui (12,900) and the Bassari (11,300), both fetishistic tribes, who dwell in the northwest of the colony near the borders of Senegal and Portuguese Guinea The Timene, in the southwest, are mainly fetishistic, quarrelsome, and degraded Allied to the Timene are the Landuman (21,700) and the Baga (23,900), of the northwest coastal region The Landuman are fetishistic, drunken, and degraded and seem likely to perish The Baga are mild in disposition, but drunken, an official French report says that their ears are set near the top of the head The Toma (36,300), allied to the Malinke, dwell along the borders of Liberia and Sierra Leone They are fetishists, as also are their neighbors, the Kissien (104,500), the latter are timid, of small stature, and agricultural

The coast of French Guinea was known to Portuguese explorers at an early date In the first part of the seventeenth century French merchants began trading in parts of the country, and in 1685 the Compagnie de Guinée obtained from Louis XIV exclusive commercial privileges for a large part of the west African coast, and the region was embraced in a general way in the French "pacte colonial" The littoral portion, called Rivières du Sud, was taken possession of outright by France during the period from 1854 to 1869 The French, in 1884–85, obtained a footing in Bure and forced the Almami rulers of Futa Jallon and neighboring districts on the east to a treaty of peace in 1887 A stubborn contest was next undertaken with Samori and his newly founded Kingdom of Wassulu, on the southern head streams of the Niger, northeast of Liberia In February, 1891, at Kankan, on the Milo, he was defeated and driven out of Bissandugu, Sanakoro, and Keruane, and his followers, the Sofa, were scattered In 1899 that part of the Sudan which contained the upper Niger districts was added to the Guinea Colony The latest addition was the Los Islands in 1904 Consult Aspe-Fleurimont, *La Guinée française* (Paris, 1900), Le Barbier, *Dans la Haute Guinée* (ib, 1904), Arcin, *La Guinée française* (ib, 1906)

FRENCH HORN. A name assigned to the horn without pistons formerly much used in the full orchestra It has a range from $B\flat_1$ to f^2, but the four tones at either extreme are difficult and seldom used See HORN

FRENCH INDIA See INDIA, FRENCH

FRENCH INDO-CHINA The general name for the French possessions in southeast Asia, to wit, the Colony of Cochin-China and the protectorates of Tongking, Laos, Annam, Cambodia, and Battambang (For further information, see these different headings) French Indo-China is bounded by China on the north, the China Sea on the east and south, the Gulf of Siam on the southwest, and on the west, where the Mekong River was formerly the boundary line between the French possessions and Siam, the line has been pushed, by the Treaty of 1904, farther west at the expense of Siam, in the northwest as well as the southwest The estimated area and population of French Indo-China in 1914 are given as follows

	Area in sq miles	Population
Tongking	46,000	8,000,000
Annam	51,000	4,200,000
Laos	108,000	800,000
Cambodia	37,400	1,500,000
Cochin-China	21,900	3,000,000
Battambang		500,000
	256,200	18,000,000

The estimated population for 1921, 20,000,000

The French emigration to Indo-China is very small, but the Republic is organizing the affairs and improving the commercial and industrial conditions of the country At the head of the administration is the governor-general in Saigon, under whom are the governor of Cochin-China and the resident superiors of the four protectorates Kwang Chow Wan, on the China coast, is also since 1900 a political part of Indo-China, having been leased from China for 99 years Its area is about 190 square miles and its population about 170,000 Luang Probang, the territory around Battambang, was ceded by Siam in 1907, and is now administered by the Government of Indo-China as a quasi protectorate Since 1887 a customs union has united these various possessions In 1912 the imports were valued at $52,726,427, the exports at $50,321,959 Of total imports, France and her colonies send about 50 per cent In 1912 the Philippine Islands received $6,477,126 worth of rice from French Indo-China. Rice and rice products formed 56 per cent of the exports in 1912 There is little American trade, with the exception of kerosene, owing to the high tariff and the absence of direct lines of communication Practically all the transit trade is to and from the Province of Yunnan in China, over the Yunnan Railway The local budget for Indo-

China for 1912 was estimated, in piastres, at 59,580,500 The receipts are derived chiefly from government monopolies, customs, railways, telegraphs, and posts The Indo-China Bank is a large institution, capital 36,000,000 francs, and is especially engaged in furthering local enterprises In 1912 there were 1183 miles of railway The army in 1913 consisted of 10,873 European and 13,816 native troops, all under French officers The naval force consisted in 1913 of 4500 men

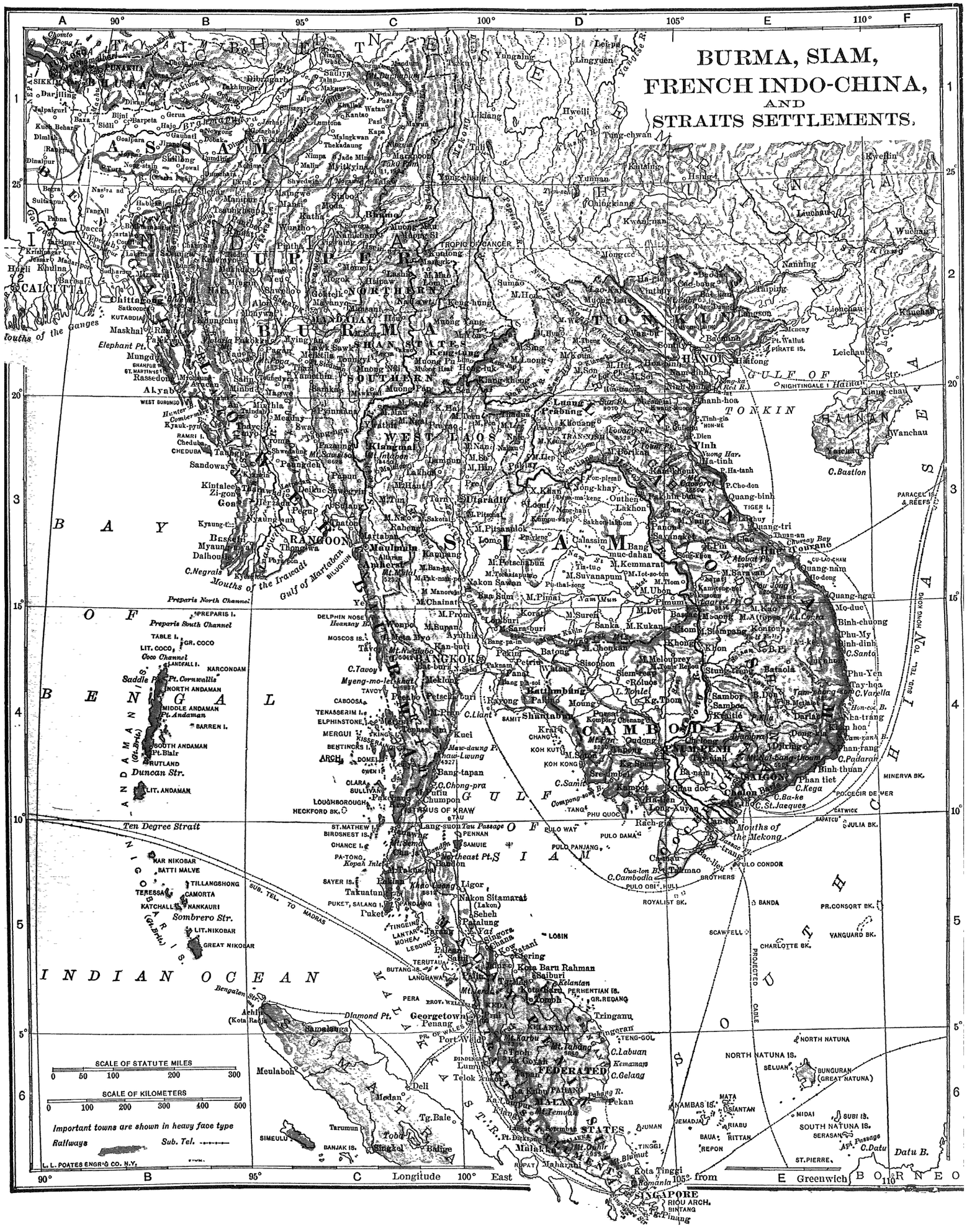
The beginning of French influence in southeastern Asia may be traced to missionary efforts These were begun in the seventeenth century in Siam, whence they spread to Tongking and Annam A Siamese embassy appeared at the court of Louis XIV in 1685 In 1774 local troubles broke out in Annam, and King Gya-Long was forced to seek shelter with the French Bishop in the Province of Saigon Military aid on a large scale was promised, but the troubles in France delayed operations until 1802, when, with the assistance of the French, King Gya-Long regained his throne His dominion extended over what is now French Indo-China Several French officers remained in his service, and French engineers fortified the chief cities King Gya-Long gave certain privileges to French and Spanish missionaries, but his successors were less friendly The advisers of King Minh-man, about 1820, urged him to a policy of repression which turned into persecution In 1861 the French began the conquest of Cochin China, and in 1867 they established a protectorate over Cambodia In 1884 Annam was brought into the same relation to the French power In 1882 the conquest of Tongking was begun and was completed within four years, though the French met with repeated disasters in their conflict with the Chinese In 1887 the governor-generalship of Indo-China was formed In 1893 the Laos protectorate, ceded by Siam, was added In 1898 and 1899 the Kwangchow-wan territory was leased from China, and in 1907 Battambang was ceded by Siam See ANNAM; COCHIN-CHINA, TONGKING

FRENCH LANGUAGE. History The earliest-known inhabitants of the country now called France were the Gauls, or Celts They spoke the Gaulish, or Primitive Celtic, language, which is the parent stem of Irish, Welsh, Breton, and other modern Celtic languages (See CELTIC LANGUAGES) During the first century B C the Romans under Julius Cæsar conquered Gaul and gradually imposed the Latin language upon its inhabitants In Rome at this time there were two forms of Latin in constant use—that of the writers and orators, called the *sermo urbanus*, and that of the uneducated classes, known as the *lingua vulgaris* The soldiers, merchants, and others who came to colonize Gaul used almost exclusively the latter, and the spread of its use was so rapid that by the end of the fourth century A D practically every trace of Celtic, excepting in a few remote districts, had disappeared It was thought for a time that Brittany, because of its insular situation, had offered a last refuge to the old language, but more recent investigations have shown that Latin had been victorious here as elsewhere in France, for the modern Celtic dialect spoken in this province at the present time is apparently due to the exodus of the Celtic inhabitants from the British Isles at the time of the Saxon invasion from the fifth to the seventh centuries A D Henri Estienne and Claude Fauchet, who wrote in the latter part of the sixteenth century, were among the first to note the true origin of the French language, but it is the philologists of the nineteenth century, especially Diez, the well-known German scholar, to whom the honor is due of having established French philology on a scientific basis Sporadic attempts have been made to prove that the Gauls did not give up the tongue of their ancestors, but that Latin and Celtic possess in common a number of roots, and that French can as easily be traced back to Celtic as to Latin However, very few scholars give this theory serious consideration, since Thurneysen, *Keltoromanisches* (Halle, 1884), and others have shown that the influence of Celtic on French has been very slight, even in regard to the vocabulary, in which the number of pure Celtic words does not exceed 50 Among the words which have passed thus from the Celtic through the *lingua vulgaris* into French, the following may be noted Lat -Celt *alauda*, OF *aloe*, from which is derived the Mod Fr dim *alouette*, a lark, Lat -Celt *beccô* or *beccus*, Fr *bec*, beak, Celt *braca*, Lat *brâca*, Fr *braie*, clout, breeches, Celt *bulga*, Fr *bouge*, closet, Lat -Celt *carrus* (OIr *carr*), Fr *char*, Celt *carruca*>*charrue*, car, Lat -Celt *leuga* or *leuca*, Fr *lieue*, league, Celt *sagos*, military blouse, Lat -Celt *sagum*, Fr *saie*, sagum or military cloak, etc French toponymy has preserved a fairly large number of Celtic words

In the fifth century Gaul was conquered a second time by the Visigoths, Burgundians, and Franks, the last of whom, the strongest of the Germanic tribes, established themselves firmly in northern France, after having been driven back from the southern part of the country by Syagrius in 486 But this time the conquerors adopted the language of the conquered because of their intellectual and moral superiority Hence the only influence left by the Germanic tribes on the language of Gaul are some 400 words pertaining to war, public and private institutions, names of animals and plants, and household terms Among these the following may be mentioned *Franko*, free man, Fr *franc*, free, and *français*, French, through the Lat *frankiscus*, *Alaman*, name of a Germanic tribe, OF *Alemant*, Mod Fr *Allemand*, *Ludwig*, OF *Loois*, Mod Fr *Louis*, ONFrank *bergfrid*, Fr *beffroi*, belfry, *herberga*, OF *alberge* and *herberge*, Mod Fr. *auberge*, inn, and *hébergе*, lodging, *faldastol*, OF *faldestoel*, Mod Fr *fauteuil*, armchair, *filt*, OF *feltre*, Mod Fr *feutre*, felt, *marahshalk*, horse servant or groom, Fr *marechal*, blacksmith, marshal, *werra*, Fr *guerre*, war, etc

A considerable number of Greek words were introduced into the *lingua vulgaris* at many different periods, either directly or through the literary Latin Some may have come into France in the sixth century through the Greek colonies along the Mediterranean, such as Marseilles and Nice Thus, Gk *βαστάζειν*, Lat *bastum*, Fr *bât*, packsaddle, Gk *βλασφημεῖν*, Lat *blasphemare*, Fr *blâmer*, Gk *βύρσα*, Lat *bursa*, OF *borse*, Fr *bourse*, exchange, Gk *κόλλα*, Lat *colla*, Fr *colle*, glue, Gk *ἡμικρανία*, Lat *hēmicrānia*, Fr *migraine*, megrim, headache, etc In subsequent periods many words were introduced through the influence of the Church, such as *évêque*, *prêtre*, *hérétique*, *moine*, *basilique*, while still others were borrowed by scholars

By the seventh century the idiom spoken in


BURMA, SIAM,
FRENCH INDO-CHINA,
AND
STRAITS SETTLEMENTS.
BAY OF BENGAL
INDIAN OCEAN
GULF OF TONKIN
GULF OF SIAM
BURMA
SIAM
TONKIN
ANNAM
COCHINCHINA
CAMBODIA
WEST LAOS
SOUTHERN SHAN STATES
NORTHERN SHAN STATES
FEDERATED MALAY STATES
CALCUTTA
RANGOON
BANGKOK
HANOI
SAIGON
PHNOM PENH
SINGAPORE
Ten Degree Strait
Preparis North Channel
Preparis South Channel
Coco Channel
Saddle Pk.
Duncan Str.
Sombrero Str.
Mouths of the Irawadi
Gulf of Martaban
Mouths of the Mekong
Mouths of the Ganges
Elephant Pt.
C.Negrais
C.Tavoy
C.Liant
C.Samit
C.Cambodia
C.Bastion
C.Varella
C.Padaran
C.Ba-ke
C.St.Jaeques
C.Kega
C.Labuan
C.Gelang
C.Datu
Datu B.
Diamond Pt.
Bengalen Str.
Duan Str.
Tonkin Str.
Tonkin Str.
Hainan Str.
Formosa Str.
Luzon Str.
Malacca Str.
Sub. Tel. to Madras
Sub. Tel. to Hong Kong
Projected Cable
Paracel Is. & Reefs
Minerva Bk.
Po-Cecir de Mer
Pr. Consort Bk.
Vanguard Bk.
Charlotte Bk.
Scawfell
Royalist Bk.
Pulo Condor
Pulo Panjang
Pulo Way
Pulo Dama
Pulo Obi
Pulo Cecir
Pulo Cecir de Mer
Pulo Condor
Pulo Brothers
Pulo Tinggi
Pulo Aur
Pulo Anambas Is.
Pulo Natuna Is.
North Natuna
North Natuna Is.
South Natuna Is.
Bunguran (Great Natuna)
Tonkin
Hainan
Formosa
Luzon
Malacca
Borneo
Sumatra
Java
Andaman Is.
Nicobar Is.
Sombrero Str.
Duncan Str.
Ten Degree Strait
Preparis North Channel
Preparis South Channel
Coco Channel
Saddle Pk.
Elephant Pt.
Diamond Pt.
Bengalen Str.
Duan Str.
Tonkin Str.
Hainan Str.
Formosa Str.
Luzon Str.
Malacca Str.
Sub. Tel. to Madras
Sub. Tel. to Hong Kong
Projected Cable
Paracel Is. & Reefs
Minerva Bk.
Po-Cecir de Mer
Pr. Consort Bk.
Vanguard Bk.
Charlotte Bk.
Scawfell
Royalist Bk.
Pulo Condor
Pulo Panjang
Pulo Way
Pulo Dama
Pulo Obi
Pulo Cecir

France differed enough from the popular Latin to be called the *Roman*, or *Romanic* The main transformations undergone by Latin were the disappearance or obscuration of all nonaccented syllables in words (*hospitalem* becoming *hôtel*, *rigidum*, *roide*, *liberare*, *livrer*, etc), which resulted in a great loss of case forms and tense forms, and the prevalence of analysis over synthesis in syntax (*Petri* becoming *de Petro*, *amavi* being replaced by *amatum*, *habeo*, *habet* requiring the subject *ille* and becoming *ille habet*, etc) As early as the sixth century the historian Gregory of Tours remarks that "the scholarly language [Latin] is no longer understood except by a few people, while the rustic [Romanic] is understood by everybody" From the time of Gregory the homilies of the Church councils began to be translated into the popular idiom, while the *Capitulaires*, or royal edicts, of Charlemagne in the eighth century require the dignitaries of the Church to deliver their sermons in Romanic

At a very early date a marked difference was noticeable between the spoken language of the northern part of France and that of the south, the dividing line extending from Villeneuve (a little to the north of Bordeaux) southeast to Lussac, then north to Angoulême and Mansle, crossing the river Vienne just below L'Isle-Jourdain, east to the river Allier and southeast by Roanne to Saint-Etienne, a short distance south of Lyons The Saône and the Rhône are considered the eastern limits of French, since beyond these rivers from Bescançon on the north to Grenoble on the south a mixed dialect called French-Provençal was used Among the more important phonetic phenomena which distinguish French from Provençal are the transformations undergone by the free unaccented vowel *a* of Latin, which becomes *e* in French, but remains unchanged in Provençal (Lat *mare*, Prov *mar*, Fr *mer*, Lat *carricare*, Prov *cargar*, Fr *charger*) These two languages were known anciently as the *langue d'oil* and the *langue d'oc*, from the words meaning "yes," *oil* (pop Lat *hoc illi*) and *oc* (Lat *hoc*), in the two respective idioms The two languages again branched into several dialects or patois Of those of the *langue d'oil* five were especially important—those of the provinces of Ile de France, Normandy, Picardy, Poitou, and Burgundy In the twelfth century the dialect of Ile de France began to prevail over the others, thanks especially to the political predominance of the kings residing in Paris, who gradually succeeded in compelling allegiance on the part of the barons of the provinces By the end of the fourteenth century the ascendancy of this dialect was complete, and its rivals were reduced to the state of mere patois

The *langue d'oc* also separated into different dialects, such as Gascon, Languedocien, Auvergnat, Provençal, Limousin, Béarnais, etc An era of brilliant literary production that reached its height in the twelfth century seemed for a time to assure its supremacy in the future over the *langue d'oil* But after the twelfth century it declined rapidly, and though it has not yet fallen back into the condition of a patois, or spoken dialect, principally on account of the efforts of Mistral and other poets, there is little doubt that its days of importance have passed The *langue d'oil* was influenced by the *langue d'oc* from the very earliest times, but the importation of Provençal terms probably reached its height when Henry of Navarre became King of France at the end of the sixteenth century, and southern writers, such as Monluc, Du Bartas, and Montaigne, borrowed freely from their native tongue A great many of the words contributed by the *langue d'oc* to the *langue d'oil* have become archaic, so that a modern dictionary will only show some 400 or 500 words in actual use Among these words the following are the more common *accolade*, *aiguillade*, *alarguer*, *asperge*, *aubade*, *bâcler*, *badaud*, *bague*, *baladin*, *ballade*, *banquette*, *barricade*, *bastille*, *beret*, *bordel*, *bouillabaisse*, *bourgade*, *brancard*, *busserole*, *cable*, *cabrer*, *cadeau*, *cadenas*, *cadet*, *cagot*, *camail*, *cap*, *cape*, *cargaison*, *caserne*, *charade*, *cigale*, *dot*, *églantine*, *emparer*, *escalier*, *escargot*, *estrade*, *fadaise*, *farandole*, *fat*, *gabelle*, *gavotte*, *jarre*, *luzerne*, *martingale*, *mascotte*, *milan*, *mistral*, *muscat*, *sarrasin*, *soubresaut*, *soubrette*, *triolet*, *troubadour*, *velours*, *viguier*

During the twelfth and thirteenth centuries French was extensively used throughout Europe Martino da Canale and Brunetto Latini, two Italian authors, make possibly extravagant claims as to the extent of its use, which they attribute to the fact that it was "more delightful to read and to hear than any other" But we do know that Marco Polo preferred it to his own native tongue when he wrote the account of his voyages to Tartary and China in 1298, and that it was for some time the court language of Naples In Germany princes and barons engaged the services of French-born tutors for their children, while in England French was the foremost rival of the native tongue during the two centuries immediately succeeding the Norman Conquest (1066) and almost supplanted it as the form of literary expression Foreign students who were attracted from all parts of Europe to the University of Paris aided greatly in the diffusion of the language During this period an additional contribution was made to the vocabulary in the introduction of a considerable number of Arabic words due to the prestige enjoyed by Arabian science as well as to the Crusades, through which at the same time French was disseminated in the Orient Among these words are *alambic*, *alchimie*, *alcoran*, *amiral*, *arsenal*, *azur*, *balais*, *carat*, *chiffre*, *cimetière*, *coton*, *élixir*, *épinard*, *gabelle*, *gazelle*, *girafe*, *goudron*, *haras*, *julep*, *jupe*, *limon*, *luth*, *mameluk*, *matelas*, *nadir*, *nuque*, *orange*, *papegai*, *safran*, *sirop*, *tambour*, *tasse*, *zénith*, etc The fourteenth and fifteenth centuries, the epoch of the disastrous Hundred Years' War, were less important in the history of the language Even as early as the tenth century, when the classical Latin had fallen already into complete disuse, a tendency prevailed among scholars to introduce into the current language words taken bodily from Latin, and therefore unmodified by the natural process of transformation through the medium of low Latin and Romanic It happened, therefore, that a considerable number of Latin terms gave two French words—one of popular, the other of scholarly origin—to which the term "learned word" is usually given Besides *hôtel*, from Lat *hospitalem*, *hôpital* was formed, so *rigide*, *fragile*, and *libérer*, besides *roide*, *frêle*, and *livrer* from *rigidum*, *fragilem*, and *liberare* respectively These pairs of words are called doublets. This method of enriching the dictionary became quite common in the fourteenth century and lasted through the fifteenth and

sixteenth The Renaissance served only to encourage this tendency In the seventeenth century, however, a reaction set in, due to a certain extent to Molière, who, desirous of putting an end to the false erudition of his contemporaries, exposed them to pitiless attacks, especially in the third "Intermède" of the *Malade imaginaire*

But it was in the sixteenth century that the first serious attempt was made to regulate the French language, to adopt grammatical rules, and to fix the vocabulary In this laudable undertaking many picturesque and useful words were sacrificed to a need of order and to the fear of impropriety, but the language was in the end the richer thereby, since it gained many excellent dialectical terms and neologisms such as the cherished *patrie* This movement began with the *Deffence et Illustration de la Langue françoyse* of Du Bellay (1549) and culminated in the work of Malherbe in the beginning of the seventeenth century Among the old French terms that were proscribed are *ardoir* (*brûler*), *cuider* (*croire*), *desduit* (*plaisir*), *emmy* (*au milieu de*), *ire* (*colère*), *orée* (*bord*), *ost* (*armée*), *prou* (*beaucoup*) Some, like *dévaler* (*descendre*), *fétard* (*paresseux*), and others have remained in the colloquial vocabulary

The numerous wars with Italy in the first half of the sixteenth century, together with the admiration of the Pléiade for things Italian, resulted in a formidable invasion of about 800 words, which was only checked by the passionate protestations of Henri Estienne at the close of the century These two distinct influences brought in two distinct classes of words The one consists of expressions borrowed from the sphere of art *arabesque, arcade, arlequin, artisan, balustre, balcon, bouffon, burlesque, buste, carnaval, charlatan, concert, contour, corniche, esquisse, façade, feston, fugue, opéra*, etc The other is composed of military terms *alarme, alerte, bastion, canon, caporal, carrousel, cartel, cartouche, colonel, embuscade, escalade, estafilade, fantassin, sentinelle, soldat, timbale, vedette*, etc

In the early part of the seventeenth century there was a similar Spanish invasion, and French was enriched by about 200 words, especially names of animals, or of exotic products, and words of American origin, such as *abricot, alcôve, bizarre, camarade, cacao, chocolat, cigarre, coca, créole, duègne, mantille, marmelade, nègre, patate, sérénade, sieste, tomate, vanille*, etc At the same epoch a few words came from Germany, several wars having more than once brought its inhabitants into contact with the soldiers of France *bivouac, blocus, fifre, havresac, hulot, lansquenet, obus, rosse, trinquer, sabre, cible, halte, rêitre, valser* The influence of the Précieuses (see FRENCH LITERATURE) cannot be ignored. A few illustrations of expressions coined by them and subsequently taken up in the current language may be of interest here *être de qualité, un procédé tout à fait irrégulier, une chose du dernier bourgeois, donner dans le vrai, avoir des lumières sur un sujet, avoir l'intelligence épaisse*, etc The Académie Française, founded 1635 (see ACADEMY), has always taken a rather conservative attitude The policy of its members has been from the beginning to record (*constater*), not to innovate The eighteenth century was the period in which France exerted the most remarkable influence over European civilization The glorious reign of Louis XIV had indirectly contributed to make French an international language It was recognized as such not only by politicians and by the higher society in every country, but even by the scholars who used it in their books to increase the number of their readers It was a few years after the death of Voltaire and Rousseau that the Academy of Berlin established a prize contest on the three following questions "Qu'est-ce qui a rendu la langue française universelle? Pourquoi mérite-t-elle cette prérogative? Est-il à présumer qu'elle la conserve?" The enthusiastic answer of Rivarol, known as the "Discours sur l'universalité de la langue française," was crowned (*ex æquo*, with that of a German, Schwab) The language may have increased in accuracy, clearness, and elegance during the eighteenth century, but it acquired no new qualities It may be said that, by rendering it too perfect, Voltaire robbed French of a part of its strength and originality

The Revolution gave birth to a number of new expressions The Académie had been suppressed by a decree of Aug 8, 1793, the "Sections de Grammaire et de Poésie" of the Institut (founded in 1795) took provisionally its place An edition of the *Dictionnaire* was, nevertheless, published in 1798 by the new men, and as they did not dare to introduce into it the words that had been recently coined, they put them in an appendix Some of them have disappeared, some have remained. Among the latter are *administratif, aéronaute, assignat, bureaucrate, carmagnole, centralisation, club* (pronounced clob), *décade, démoraliser, divorcer, fédéraliser, guillotine, guillotiner, monarchiste, polytechnique, révolutionner, septembriser, terrorisme*, etc Most of them, as may be seen, are clumsily constructed In the early part of the nineteenth century the Romanticists tried to bring new life into the language by adopting French words which had been given up in the course of previous periods Victor Hugo says of himself, that he has

"tiré de l'enfer
Tous les vieux mots damnés, légion sépulcrale"

This, however, was imitation of life, not life itself, and the movement soon died out, until a new and still less successful effort in the same direction was made by the poets of the Symbolist school (especially by the group of the Romanists) in 1896. (See the *Glossaire* by Plowert—pseudonym for Paul Adam) Two events of great importance took place in the second half of the nineteenth century First, the cosmopolitan tendency common at this epoch to all European languages made itself felt in French Its most noticeable result is the influx of English words· the more one advances, the more Anglomania seems to gain ground All attempts to check the movement have proved vain Endless lists of these borrowed terms have been made by scholars *bol, boxe, boule-dogue, châle, chèque, clown, convict, dandy, drainer, fashionable, groom, handicap, humour, interview, lunch, meeting, plaid, puddler, speech, sport, square, steamer, tender, ticket, toast, touriste, tunnel, verdict, wagon, waterproof, whist*, etc The second event is the still greater invasion of scientific terms which are common to all countries *photographie, télégraphe, téléphone, anémometrie, antalgique, automobile, aéroplane*, etc This double current results naturally in a continual proportional decrease of the stock of genuine French words The purity and the beauty of the language do not gain by it,

either, and Petit de Julleville's statement seems to be correct—viz, that the new terms have "demesurément grossi plutôt qu'enrichi le vocabulaire" Littre, Nodier, Jullien, Egger, Darmesteter, Brunot, have raised their voices in vain in the sense of Petit de Julleville The Académie itself can no longer resist, no less than 2200 neologisms were inserted in the seventh edition of the *Dictionnaire* in 1878

The present state of the French language may be tabulated roughly as follows, taking as our basis the 32,000 words of the last edition of the *Dictionnaire de l'Académie*

Of Latin stock	3,800
Of early Germanic origin	400
By derivation from primitive words (such as *richard, enrichir*, from *riche, pauvrette*, from *pauvre*)	7,800
Of foreign and scholarly origin	20,000
	32,000

Moreover, the style cannot be said to have improved The simultaneous influences of science and realism have dried it up, and that of the newspapers, which grows daily, is a constant source of corruption However, a few individual writers, like Renan and Anatole France, Remy de Gourmont and Barrès, in the second half of the nineteenth century, as Châteaubriand at its opening, have gloriously upheld the traditions of pure and elegant French

French is used by about 40,000,000 people It is the language of the greatest part of France (Brittany and a few southern districts only being excepted), of part of Belgium and Switzerland, and part of Canada. If English has become the predominant language in civilized countries, French is still considered the most refined among the leading idioms of the earth

It has been proposed several times as an international language, especially by Schwab, a German (1784), and recently by Novicov, the Russian economist, and by H G Wells, in his volume *Anticipations*

Grammar and Syntax For the early period, see ROMANCE LANGUAGES For a long time no uniform system of orthography existed If one reads, e g, the fable of "The Wolf and the Lamb," by Marie de France (thirteenth century), it will be found that within 38 lines the word for lamb is spelled in six different ways, and that for wolf in four The example of Rabelais who wrote the word for oil in three different ways within the space of six lines is often quoted We have seen that the regulation of the language began in the sixteenth century At once two schools were formed disputing over the best method of spelling, one of these demanded etymological, the other phonetic, orthography As erudition was in favor at the time, the phonetic system had to yield, and a number of useless letters were wrongly introduced under the pretext of etymology *d* in *poids*, *b* in *debvoir*, *l* in *chevaulx*, *veult*, and even *peult*, *dîner*, a contraction of *déjeuner*, was written *dipner*, as if from the Greek δειπνεῖν

In the seventeenth century a number of these letters were dropped, but new attempts at phonetic spelling failed once more Grammar and syntax at this period are still in a state of disorder The greatest writers are at variance as to the gender of certain words; the existence of rules for the use of the partitive article and of the personal pronouns is only vaguely suspected, the comparative is occasionally used for the superlative, the participles, present and past, agree or do not agree at the will of the writer It was, however, at that epoch that the present rules of the agreement of participles was formulated by Vaugelas, in his *Remarques sur la langue française* Briefly, it may be said that the seventeenth century observed the logical rather than the grammatical connection of words

In the eighteenth century the rules established during the previous period were gradually carried out, and the liberties of syntax and orthography were dropped one by one Owing to the influence of the experimental philosophy, requiring precision of style, the sentences became gradually shorter, while the long harmonious period of the classical age fast disappeared Already at the close of the seventeenth century, Bayle protests against this simplification of style, which he considers a degeneration "Ils recommencement une période à chaque ligne, c'est prendre le parti le plus facile, un paresseux s'accomode fort de cela" The Académie, in the 1742 edition of its *Dictionnaire*, drops a number of double letters, replaces the *s* by a circumflex before a consonant (*blâme* for *blasme*), and in a few cases substitutes an *i* for the *y* In the edition of 1762 other innovations have to be recorded—viz, the distinction of *i* and *j* and of *u* and *v*

The early part of the twentieth century was an era of orthographic reforms After 1890 societies were organized in France, Belgium, and Switzerland in order to bring about the desired improvements They established a special organ, *Le Réformiste*, edited by Jean Barès, who made his fortune in South America and devoted considerable sums of money to the cause In 1903 the Minister of Public Instruction (then M Chaumié) appointed a commission composed of the best scholars, e g, Gaston Paris, F Brunot, P Meyer, L Havet The report written by P Meyer and handed in in 1905 marks a date in the movement, in the main it was very favorable to reform The French Academy refused to accept most of the propositions A new commission had to be appointed for conciliation The report, written by M Brunot, was handed in in June, 1906

Phonetics For early period, see ROMANCE LANGUAGES In the sixteenth century the pronunciation of the letters was as variable as orthography The letters *a* and *e* were interchangeable, the same is true of *ou* and *u*, *ou* and *eu*, *oi* and *ai* The *e*, rarely accentuated, assumes different sounds The consonants *s* and *z*, *s* and *r*, are used freely, the one for the other, *oiseau* and *oizeau*, and while in most cases one of the two forms has disappeared, both *chaise* and *chaire* have continued to be used simultaneously, though with different meanings Phonetics are in close connection with orthography, and they have been studied with great care since the middle of the nineteenth century, especially with a practical object in view Lesaint, Vogel, and, above all, Paul Passy, Abbé Rousselot, should here be mentioned Passy's little treatise, *Les sons du français*, is widely known, Eng trans by Savory and Jones (Oxford, 1907) Rousselot's *Principes de phonétique expérimentale* (2 vols, Paris, 1901–08) is the standard work on the subject of experimental phonetics Ch Nyrop, a Dane, has also made for himself a reputation in this domain His *Manuel phonétique du français parlé* (2d ed, Paris, 1902) is a model of patient, accurate, and impartial labor Among the workers

in this field who have come to the front in the United States is Prof J Geddes, Jr, author of a valuable work on *French Pronunciation* (New York, 1913) See PHONETICS.

Versification The chief element of Latin poetry was the quantity of the syllables This has been altogether given up in French versification A few poets, especially in the sixteenth century, Baif and Jodelle, e g (see FRENCH LITERATURE), under the influence of the Renaissance, tried to write French poetry according to the Latin system They never succeeded in producing anything satisfactory

The elements of French versification are three 1 The number of syllables, from 12 down The mute syllables at the end of a verse never count, in the middle of the verse the final silent *e* counts only when the following word begins with a consonant In the Middle Ages the poet was very free, in the classical period he was less so The Symbolists and other poets of the end of the nineteenth century have frequently allowed themselves as great a liberty as the poets of the twelfth and thirteenth centuries 2 The accentuation. The verse must always end on an accented syllable, and if the verse is divided into smaller parts (e g, 6 + 6, 4 + 4 + 4, 6 + 4, 4 + 4, etc), each part in its turn must end on an accented syllable By accented, one must understand the last syllable of a word of importance for the meaning conveyed, or an important monosyllable, such as a noun or a verb Articles, conjunctions, and prepositions are rarely in place as accented syllables 3 The rhyme The original form is the assonance, i e, the repetition at the end of a verse of a vowel sound We find, e g, the following assonances in a stanza of the *Chanson de Roland* *abe, able, abre, ace, ale,* etc, or *i, id, ilz, vi,* etc Rhyme is only a more perfect assonance, the letters following the vowel being also made to agree, thus *courage, village* Still later the consonant preceding the vowel of the rhyme was required to be the same in both words (*consonne d'appui*), thus, *orage, courage* The latter is called "rime riche" or "pleine," while the other one is only "suffisante"

Different rules concerning the rhyme were added in the course of time the rhyme was to connect verses two by two, in the sixteenth century it was decreed that two masculine rhymes (i e, ending on a sounded syllable, like *amour, départ*) must alternate with two feminine rhymes (i e, ending on a silent *e*, like *table, fille*) The yoke of the narrow code of versification established by Malherbe and Boileau in the seventeenth century was not shaken off until the time of Victor Hugo and Romanticism Even their attempts to gain more liberty were temporarily crushed by the poets of the Parnassian school from 1866 onward The fight was, however, taken up again by the Symbolists the *vers libre* was the outcome of their sweeping reform According to them everything—the number of syllables, accentuation, rhyme—depends altogether upon the subjective criterion of each writer, there are as many forms of versification as there are individual poetic feelings Few of them made much use of the freedom thus regained

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FRENCH LITERATURE Until the ninth century of our era, Latin was the literary language of the country which is now called France, and it was not until two centuries later that anything that can be regarded as belonging strictly to French literature made its appearance To sketch the process by which the tongue spoken in Gaul detached itself from Latin and evolved into a new national language is not within the province of this article Suffice it here to say that in the seventh century there are references to this new romance language—the *lingua Romana rustica*—and that by the eighth century it was heard even in the pulpits of France To the last-named century belong the glossaries of Reichenau and Cassel—lists containing in the first instance Latin and Romance (Old French) equivalents, and in the second Old German and Romance equivalents The oldest linguistic monument of the French tongue, the text giving the oaths interchanged at Strassburg in 842 between the two grandsons of Charlemagne, Louis the German and Charles the Bald, against their brother Lothair, is of the ninth century, and to the tenth century are attributed the earliest quasi-literary documents, the "Cantilène de Sainte Fulalie," a short song celebrating the saint's martyrdom, the "Fragment de Valenciennes," a homily on the prophet Jonas, and the "Life of St Leger" in 240 eight-syllable lines This brings us to the eleventh century, when the earliest form which finished literature took in France appeared—that of the so-called *chansons de gestes* (or *geste*) But, before considering this form, a conspicuous poem of a religious cast, the "Life of Saint Alexis" consisting of some 600 ten-syllable verses, in five-line stanzas, and belonging to the middle of the tenth century, should have passing mention To return to the *chanson de geste* To the end of the eleventh century belongs the flowering of the national epos, the *Chansons de Geste* These were long poems relating the heroic deeds of Christian knights

(*gestes*, Lat *gesta*, deeds), which were composed, according to the best accepted authority, M Joseph Bédier, by monks and jongleurs to entertain the pilgrims stopping at the various abbeys on their way to some fair or sacred place of pilgrimage The monks furnished the material from various legends and from the chronicles, while the jongleurs are supposed to have shaped these stories into the famous epics that have come down to us and which they themselves either read or sang Both the poets and the singers were for a while a great power in the society of the Middle Ages, as they were able to make and unmake the reputation of a baron by what they chose to sing of him or of his ancestors Their influence has been compared to that of the newspapers of later centuries. They allowed themselves to be bribed later on, and the kings and the Church had to make severe laws against them The authors of the *chansons* drew their inspiration mainly from three different sources, and their poems belong accordingly to one of the three groups known as the French, the Breton, and the Classical cycles.

The *Cycle de France* deals especially with French heroes who had put their arms at the service of God and the Church The central figure is Charlemagne, who is made the great champion of Christianity The task ascribed to him is the same as Christ's—to conquer the world for God The great Emperor was represented as surrounded by his vassals, as Christ by His disciples There were 12 chief barons, the peers of France, as there had been 12 Apostles, one of the Apostles had been a traitor, so there was a traitor (Ganelon) among the 12 peers God repeated in favor of His kingly servant the miracles He performed formerly for His chosen people He stopped the sun in its course in order to allow the Christian knights to complete the extermination of the pagans, and at times He sent down His angels to deliver heavenly messages and to help His soldiers in case of great danger The most ancient, beautiful, and famous of the epics of this group is the *Chanson de Roland*, composed probably at the end of the eleventh century, containing about 4000 verses, whose author is not known The rear guard of Charlemagne, headed by Roland, is attacked and cut to pieces in the pass of Roncesvalles in the Pyrenees, and none escape It is on this rather thin theme that legend worked and brought forth the great *chanson* in three parts the betrayal of Roland by Ganelon, the death of Roland at Roncesvalles with the 11 other peers and 20,000 men, and the avenging of Roland achieved by Charlemagne The sincere Christian spirit underlying the whole poem is wonderfully well shown in the beautiful figure of the bishop knight, Turpin Other remarkable *chansons* of the *Cycle de France* are *Aliscans, Raoul de Cambrai, Garin le Lorrain, Les quatre fils Aymon, Ogier le Danois*

The *Cycle de Bretagne* displays an altogether different spirit, as already shown by the second title often given to it, *L'Epopée courtoise* Its chief poet is Chrétien de Troyes, through whose influence the earlier Celtic mysticism, melancholy brooding, and passionate love element, of the primitive legends were "transformed into an exemplification of the social graces and of courtly love," according to Prof C H Conrad Wright Chivalrous deeds are here still in great honor but they are no longer performed for the sake of God and the Church and "la douce France." A true Christian spirit is rarely present, despite the frequent allusions to the Bible or to ecclesiastical customs, and the use made of certain pseudoevangelical scenes, as, e g, in the rather extraordinary fusion of the originally pagan legends of Brittany with the Christian legend of the Holy Grail in the last and unfinished poem of Chrétien de Troyes, *Perceval le Gallois* Love, conceived of as the source of all human virtues and impersonated in fair ladies, may be said to be in this cycle the only power which claims the devotion of knights and barons The central figure is here Arthur, or Artus, King of Brittany He also is surrounded by 12 peers, with a traitor (Mordret) The 12 peers are seated at a round table, the symbol of the perfect equality of them all, hence the name of Knights of the Round Table often given to them The principal poems of the cycle are *Lancelot du Lac, Ivain le chevalier au lion, Erec et Enide, Merlin, Tristan, Perceval* In no one does the spirit of the whole cycle come out in its good and bad features so clearly as in the romance of *Tristan and Iseut* Under strict orthodox appearances the fundamental ideas at work are worldly love and pagan fatality, as shown in the symbolic passion-breeding philtre Those ideas were added by and by to the original story (Consult Bédier's remarkable *Roman de Tristan*, 1905) Shorter poems, treating Breton legends, are in close connection with the *Epopée courtoise* They are called the *lais Bretons* and were sung like the epics Love is the only motive, and the *esprit chevaleresque* in the modern sense of the word comes out still more unhampered than before, and even with a foretaste of *préciosité* The scenes are laid in Brittany or in Wales Marie de France is the author of these graceful poems The best known, most refined, and at the same time most characteristic of her sentimental strain are *Eliduc, Les deux amants, Le rossignol, Lyonec* Among the *lais* of other authors may be mentioned *Tydorel; Guingamor, Graelent, Doon, L'Epine* To the same kind of literature, although the heroes are not from Brittany, belongs *Aucassin et Nicolette*, a "chante-fable" of the twelfth or thirteenth century It gives, half in prose and half in verse, the story of the love of a noble's son for a slave girl, who finally turns out to be a king's daughter

The *Cycle antique* is the least important of the three groups of epics The authors turned to antiquity to find new material for their poems, they Christianized Agamemnon, Achilles, Ulysses, and all the heroes of Thebes, Troy, and Rome The best known among their productions is the *Roman d'Alexandre*, which contains some most extravagant adventures It was written probably in the twelfth century, by Alexandre de Bernay, has 12,000 verses of 12 syllables, instead of 10, as in the *Cycle de France* and the *Cycle Breton* The *Roman de Thèbes* and the *Roman de Troye*, belonging to the same group, are composed of octosyllabic lines

All this mass of epic and chivalrous literature dealt with heroes taken from the higher classes of society and was more particularly written for the nobility There existed, however, simultaneously a more popular literature Its products are less pretentious, but just as important as expressing the spirit of their epoch They are short stories in verse A good many among the earliest that we possess betray the absolute control of the Church over litera-

ture. The purpose of the *contes dévots* or *contes pieux* was to foster faith among the people and at the same time to bring some consolation for the hardships of life to the lowly The saints and especially the tender, compassionate Virgin prove always ready to fight the devil or intercede with God in behalf of faithful servants of the Church As the Church lost its empire over souls, and lay authors began to write, the stories that were written assumed a more worldly character If a few of the innumerable *fabliaux* or *fableaux* of the Middle Ages may be called didactic, by far the greater number have no other purpose than to entertain Some are really artistic and graceful, with that touch of satire which is characteristic of the French people, but often the wit and humor are spoiled by coarse realism Among the best may be mentioned the *Lai d'Aristote, Lai de l'oyselet, La housse partie, Le vair palefroi, Le vilain mire* (the original of Molière's *Médecin malgré lui*) The *fabliaux*, in which the talent for story-telling of the French nation is for the first time clearly shown, flourished especially during the twelfth and thirteenth centuries They became rare in the fourteenth Some of them were used at that time as themes for the stage, but most of them disappear temporarily, to be used again in prose two centuries later

The satire on the different classes of society makes its appearance on a large scale during the same period in two long poems, *Le roman de Renart* and *Le roman de la rose* The first is an animal epos of about 32,000 verses, not counting the "branches" which were added later, and which would raise this number to over 100,000 The clergy, nobles, and villains are mercilessly criticized, though seldom with bitterness Several collections of ancient animal fables written in Latin and known under the name of *Ysopets* (corruption of Esopets, or little Æsop), together with the *Bestiaires*, compositions ascribing moral traits to real or fantastic animals, had prepared the way for this kind of literature Marie de France had translated a collection of fables into French verse. There are two sworn foes in the *Roman de Renart*—Isengrin, the wolf, and Renart, the fox, symbolizing strength and cunning. The general idea underlying the different episodes is that evil reigns supreme over society, brute force crushes weakness, cunning alone can overcome strength. In the *Roman de la rose* allegory goes still further the abstract ideas themselves are personified A lover wishes to pick a symbolical rose, which grows in a symbolical garden He is helped in his undertaking by Bel Accueil, Doux penser, Espérance, etc, meanwhile fighting Danger, Male bouche (slander), Jalousie, and so forth The author of the first 4000 verses, Guillaume de Lorris, had left the poem unfinished. His sole thought had been to offer in a poetical form a kind of code of love But, 50 years later, Jean de Meun added 18,000 verses, in which, with abundant scholarly references to Ovid and other ancient authors, he directed venomous attacks against women and the conventional affected and false forms that love had assumed at this period, more especially in the higher classes of society The success of the *Roman de la rose* was considerable, not only in France, where its influence continued far into the seventeenth century, but all over Europe. Imitations and translations appeared everywhere

Lyric poetry attained a great measure of popular favor during the Middle Ages, at first more particularly in the south of France The songs of the southern *troubadours* dealt equally with morals, politics, and love, while those of the northern *trouvères* were almost exclusively about love, the lofty conception of which was borrowed from the South But a great number of ballades, pastourelles, chants-royaux, triolets, lais, virelais, sirventes, motets, were lost We know, however, about 200 names of authors, moreover, 600 of these short poems have come down to us anonymously There were a great many academies named Puys which encouraged lyric and sometimes dramatic poetry by organizing contests and awarding prizes Among the poets that we know, a special mention is due, in the twelfth century, to Conon de Béthune, Grace Brule, energetic Crusaders and delightful poets, in the thirteenth century, to Thibaut, Count of Champagne and King of Navarre, and Colin Muset, an itinerant minstrel, and in the fourteenth century, to Christine de Pisan, Eustache Deschamps, Guillaume de Marchault, and chiefly to Rutebeuf, a Parisian *trouvère* of the Bohemian type, who took great interest in the events of his time, Crusades, Church discussions, and university matters, besides his little masterpieces of lyric and satiric poetry, he wrote a few *contes dévots*, *fabliaux*, and a miracle play In the fifteenth century Charles of Orléans, after his return from England, where he was a political prisoner for 25 years, and where he wrote most of his poems, made his brilliant court an asylum for letters and art. The greatest of these lyric poets up to the sixteenth century was François des Loges, or de Montcorbier, known to fame as Villon Owing to the resistless charm of his verses, to his absolute sincerity and spontaneity of inspiration, he has more than once been regarded as a kind of patron saint by the lyric poets of the nineteenth century His chief compositions are two collections of short poems, *Le grand testament*, in which is to be found one of the most famous poems in French literature, "La ballade des dames du temps jadis," and *Le petit testament*

The theatre is the field in which the evolution of literature during the Middle Ages is most clearly shown. At first an institution of the Church, it gradually severed its connection with it, until finally theatre and Church came to be mortal enemies The *drames liturgiques* of the eleventh century were representations in the churches of biblical scenes, more especially of the nativity and passion of Christ. They were written in Latin prose and composed exclusively of sentences of the Holy Scriptures Moreover, the actors were all *clerici*, i e, officers of the Church Then came, in the twelfth century, the *drame profane*, or *sécularisé* The scenes are still biblical, but imagination is permitted to play a greater part, the language is no longer Latin, the actors are laymen, the stage is removed from the church to some public place The *Représentation d'Adam* is the only piece preserved in its integrity that belongs to this early period of the French stage The scenes are episodes from the Book of Genesis They are followed by predictions by the prophets of the coming of Christ, and the performance ends with a sermon describing the terrible signs which will form a prelude to the Last Judgment In the thirteenth century the scope of the theatre is extended by the addition of miracle plays illustrating the marvelous deeds of the saints and

especially of the Virgin Rutebeuf has put in dramatic form the old *fabliau* of St Théophile, whom Mary frees from the clutches of Satan *Le jeu de Saint Nicolas*, by Jean Bodel, another miracle of the same epoch, offers several scenes which have nothing to do with religion Even a few purely comical pieces, such as *Le jeu d'Adam ou de la feuillée*, by Adam de la Halle, are now represented, though they seem to be an exception In this same period we find the first example of the pastoral play and comic opera, *Le jeu de Robin et de Marion*

In the fourteenth century, which, on account of continual political and social disorders, was rather poor in literary productions of any kind, no new step towards emancipation from the church is noticeable The *Miracles de Notre Dame* remained the favorite theme, while scenes for religious plays are borrowed from all quarters, even from the *chansons de geste* and *romans d'aventure*

No form of literature is more popular during the fifteenth century than the theatre *Mystère* is the name given henceforth to religious and even, though rarely, to nonreligious plays, as, e g, the *Mystère du siège d'Orléans*, which represents the rescue of that city by Joan of Arc, and the *Mystère de la destruction de Troie* A feverish interest in theatrical representations took hold of the people at that period The *mysteries* were put on the stage with most elaborate machinery Some of them had over 50,000 verses and lasted several days There was, however, something artificial about this universal enthusiasm, the plays are prolix, moreover, a tasteless abuse of the comic and coarse elements clearly indicates that the genre had outlived itself In 1548 the government had to withdraw the license to play from the Confrères de la Passion, a society of actors in Paris, on account of the lack of decency in these so-called religious performances, and thus put an end to the mysteries On the other hand, the profane theatre, free from the influence of the Church, was then coming to the front full of life and vigor

The three principal kinds of plays in the second half of the fifteenth century are the *moralités*, the *farces*, and the *sotties* The *moralités* are a genre between the religious and the comic, sometimes grave, sometimes gay, they have a didactic purpose, frequently the characters are allegorical, like those of the *Roman de la rose*, which had set the fashion The *farces* correspond on the stage to the *fabliaux* in the evolution of the verse story-telling, they are mildly satirical, the main purpose being to amuse Coarseness is a common feature Here belongs the first masterpiece of the French comic theatre, *L'Avocat Pathelin*, the author of which is not known The sincerity of its humor and the keenness of its psychological observation are remarkable The *moralités* and the *farces* were performed by special associations, such as the Confrères de la Basoche, in Paris The *sotties* were played by the Confrères des Sots (fools), who only assumed the guise of folly as a stalking-horse for their wit, and for attacks on the clergy, nobility, and all other great personages of the day Originally they were merely farcical interludes of the mysteries, but owing to their revolutionary character they had to be removed from the latter and thus acquired independent existence

Except in one domain, that of history, one may well say that prose does not count in French literature before the sixteenth century Translations are few The long *romans d'aventures* that have enjoyed a certain popularity since the thirteenth century are nothing but dreary, prolix repetitions in prose of the *chansons de gestes* and *épopées courtoises* Leaving aside Wace's *Roman de Rou*, also called *La geste des Normands*, which is a treatment in verse of the history of the dukes of Normandy during the tenth century, there are only a few historians deserving of mention in the twelfth century Villehardouin, who relates, in his *Histoire de la prise de Constantinople*, the story of the Fourth Crusade, in which he personally took part, in the thirteenth century, Joinville (*Mémoires sur la vie de Saint Louis*), one of the vassals of Louis IX, whom he accompanied in his first expedition to the Orient, in the fourteenth century, Christine de Pisan (*Vie de Charles V*), Alain Chartier (*Histoire de Charles VII*), and especially Froissart, who in his *Chroniques* gives a somewhat disconnected but most vivid picture of the brilliant period of the *chevalerie* (his authorship of many of the best chapters is now questioned), in the fifteenth century we have in the *Mémoires* of Commines the first connected account of political events from the point of view of a statesman—he has many ideas in common with Machiavelli and is the precursor of many eminent philosophical historians in France, of the type of Bossuet, Montesquieu, Guizot, Thiers, Michelet, and Taine.

The sixteenth century was a period of transition, marked by the penetration into France of the ideas of the Renaissance As regards the stock of ideas available for artistic purposes, it must be acknowledged that French literature had become rather thin since the time of the great epics Italian influence then introduced a more artistic and intelligent understanding of the classical authors of Rome and an extremely stimulating, if superficial, acquaintance with the philosophies of Plato and Aristotle, poorly interpreted before that time in France This revival gave rise to two opposing factions of humanistic scholars—the Hellenists, who only admired the Greek authors, and the Ciceronians, who advocated the exclusive imitation of Cicero The humanistic movement introduced a rationalistic philosophy, based on the harmony of mind and matter and the belief in the goodness of nature, all of which was tempered with a desire to imitate the Greek form of highly polished art The individualistic note, which was destined to be silenced temporarily during the seventeenth century, came from the struggles of the Reformation against the despotic authority of the corrupt powers of the Church Thus, the sixteenth century, in France at least, is permeated for the most part by Platonism and Individualism In 1531 Francis I had established the Collège Royal de France (now Collège de France), in which only Hebrew, Latin, and Greek were at first taught, other studies coming later The influence of this institution was almost instantaneous, and a rich harvest of scholars was the result Among them were such men as Budé, Daurat, Pierre de la Ramée, and especially two who acquired a world-wide reputation—Jacques Amyot, thanks to his admirable translation of the *Lives* of Plutarch, and Henri Estienne, the author of the *Thesaurus Linguæ Græcæ* (a work of immense erudition for the time), of the *Traité de la conformité du*

langage français avec le grec, and of the *Précellence du langage français*, in which he protests against the invasion of Italian idioms that was taking place at this epoch See FRENCH LANGUAGE

The influence of the Renaissance was especially marked in the domain of poetry The last poet in the manner of Rutebeuf and Villon was Clément Marot In his epistles, ballades, elegies, epigrams, etc, we find the same wit and satirical humor as in the work of his predecessors He was, however, by no means a stranger to the new opinions, his attitude in religious matters roused persecution, against which he had to take refuge in Italy, where he died His disciple, Mellin de Saint-Gelais, created a permanent place for the sonnet in French poetry Moreover, his translations of authors like Vergil and Ovid prove his interest in ancient literature Lemaire de Belges deserves mention here, for, while a product of the preceding generation, the lyric note of his poetry foreshadows the spirit of the Renaissance, his works inspired much in Ronsard's *Franciade* as well as in Rabelais's *Gargantua* But it remained for the poets of the next generation to give vent in their original compositions to the new spirit created by the Renaissance Seven of them—the poets of the Pléiade, Daurat, Du Bellay, Ronsard, Belleau, Jodelle, Baif, Ponthus de Thiard—combined their efforts to bring about a new literary era Their aspirations are set forth theoretically in Du Bellay's *Défense et illustration de la langue française* (1549), and practically in a great number of poetical writings Ronsard is, by common consent, considered the head of the group With the sole exception of tragedy, he endeavored to resuscitate all the genres of antiquity, even the epos (*La franciade*), and furthermore adopted the Italian sonnet, which had come in along with the Renaissance The three directing principles of the school are (1) their contempt for the light French poetry of the foregoing centuries, such as Villon's and Marot's, (2) their belief that one who wishes to do truly artistic work must study the ancients and imitate them, (3) their love for French vernacular With regard to the last point the work of the Pléiade has been long misunderstood They have been accused of overloading French with strange words On the contrary, they protested, as a matter of fact, against the tendency manifested by many unintelligent Humanists to introduce into French a number of Greek and Latin terms which gave the language a false air of erudition and made it heavy and inharmonious. A famous verse of Boileau on Ronsard,

"Mais sa muse en français parlait grec et latin,"

is responsible for the error of three centuries. Malherbe, though himself convinced of his complete disagreement with Ronsard, was really aiming at the same goal, i e, the purification and refinement of the French language and poetry But while Ronsard was a true artist, who could rely upon his literary tact and feeling, Malherbe had the spirit of system, requiring rules in all places and at all times, to the detriment of spontaneity and inspiration Malherbe's mantle was taken up later by Boileau, a man fashioned like him in the schoolmaster's world, and it is he who is responsible to no small degree for the stiffness of French poetry in the great century of its literature The yoke of Malherbe was unbearable to most poets of real talent Both Desportes and Berthaut followed Ronsard, while Mathurin de Regnier (the earliest representative of modern French satire) and Théophile de Viau deliberately attacked Malherbe, claiming the rights of freedom and originality

Jodelle, one of the members of the Pléiade, entered the only field left untouched by Ronsard in his imitations of ancient literature, and wrote his tragedy, *Cléopâtre*, in which, for the first time in France, the unities of place, time, and action were introduced through the indirect influence of Seneca, whose dramatic theory was confused with that of Aristotle, and to whom the idea of the three unities was falsely attributed Garnier followed in the steps of Jodelle Larivey imitated servilely the Italian comedy, but had the honor to provide Molière with several suggestions This century, which only raised the plot from the setting of the peasantry to that of the bourgeois, first divided the comedy into acts and scenes, it contributed but little to the dramatic field, especially with regard to higher comedy, which was to be essentially an Italian importation

In the domain of fiction, the short story in prose, already in favor in the fifteenth century when the collective work of the *Cent nouvelles nouvelles* appeared, is at its best with Marguerite de Navarre, the sister of Francis I She wrote (perhaps not without help) the *Heptameron*, an imitation of Boccaccio's *Decamerone* Part of her material is taken from the *fabliaux*. Bonaventure Despériers, her secretary, cultivated with success the same genre. The art of story-telling is also remarkably exemplified in the *Mémoires* of La Noue and in Brantôme's *Grands capitaines* and *Dames galantes* Blaise de Monluc also furnished most interesting military *Mémoires*, while scientific discoveries were recorded by Bernard Palissy and Ambroise Paré The writer who succeeded best in absorbing all that is good in antiquity, without losing the grace and freshness of French wit and humor, is Michel de Montaigne In his delightful *Essais* the philosophy and belief of the Middle Ages are compared with those of ancient civilization, and the result is the refined and gentle skepticism which has made the "Que sais-je?" of its author a watchword the echo of which will be heard in Shakespeare, throughout Descartes and Pascal, and even in our own Emerson. What Montaigne had said, with seductive art and complete freedom from pedantry, was repeated with all the apparatus of logical demonstration by his friend Charron in *De la sagesse*

When Rabelais, the greatest literary figure in the sixteenth century, appeared, the conditions all over Europe were exceedingly precarious and the prospect for the future very gloomy France had not yet recovered from the Hundred Years' War; Rome had been sacked by the French troops, and the Pope was no longer secure in it, Germany was the prey of terrible religious disorders, the Peasant Revolt, and the movement of the Anabaptists, finally, the Turks were threatening Christianity in the East Yet Rabelais had the courage to break out in Homeric laughter In his *Histoire de Gargantua et de Pantagruel*, really composed of five separate books, he ridiculed the murderous political wars of the time, the quarrels of the Church and of the different ecclesiastical orders, the pretentious and shallow erudition of the scholars, the

revolting method by which magistrates and judges rendered justice—in short, all the abuses and follies of the turbulent times, which then marked the course of European civilization But he is not content with negations, his keen good sense suggests to him a number of useful reforms in all the domains of life, education, science, religion, politics Some of these reforms have been realized, some of them we are still striving to bring about The greatest social power in the Middle Ages, the Church, had been severely shaken At this moment the Reformation appeared upon the scene of which Calvin was chief exponent in France He was so full of the idea of the absolute authority and power of God that in his *Institution chrétienne*, a masterpiece of logic and deep faith, he does not shrink from the extreme consequences of the theory of predestination His efforts against Rome were ably supported by Théodore de Béza and especially Agrippa d'Aubigné, a man of wonderful personality, whose poem in seven cantos, *Les tragiques*, is one of the most powerful outcries of indignation the world has ever heard To meet the danger of the domination of the League, a few devoted citizens (among them Pierre Pithou, Gillot, Passerat, Rapin) wrote a number of short pieces in prose and verse, in turn satirical, eloquent, comic, and grave, appealing to the patriotic feeling of their countrymen These compositions were published in book form in 1594 under the title *La satire ménippée*, the first great French political pamphlet Another political writer of the same epoch was La Boetie, the friend of Montaigne, who in his book *Traité de la servitude volontaire* expressed even then opinions which were formulated two centuries later by Rousseau and by the leaders of the French Revolution.

The seventeenth century is known as the classic century of French literature It differs from the sixteenth in its greater unity It carried the French language to a point of literary perfection, a form that will be difficult to surpass, this was attained under the influence of Malherbe, an uninspired poet, but a master of harmonious style and rhythm, who introduced the criterions of the century, pure reason and common sense Two institutions more particularly contributed to this result—the Hôtel de Rambouillet and the Académie Française The Marquise de Rambouillet brought together in her salon the most refined and cultivated people of Paris and thus exerted a beneficial influence, moral, social, and literary There Balzac, "le seul éloquent," first gave utterance to the great French "période oratoire," while Voiture was the foremost representative of the witty, light, amiable side of the French character Other salons were formed on the model of the Hôtel de Rambouillet, that of Mademoiselle de Scudéry (*les samedis de Sapho*) deserves special mention The women of the *Grand Siècle*, as Madame de Maintenon, Madame de Montespan, la Duchesse de Bouillon, were highly important factors in the general trend of literary fashions The habitués of these salons are the "précieux" and "précieuses" whom Molière was to ridicule so amusingly, yet one must not lose sight of the excellent refining results of these coteries They are apparent, e g, in the *Lettres* of Madame de Sévigné and in many other representatives of *le style épistolaire* in that century and the next

The Académie Française was first a private society of scholars, then transformed more or less willingly, in 1635, at the instigation of Richelieu, into an official state corporation The Academicians were to publish a dictionary, a grammar, and a rhetoric The dictionary alone was completed Vaugelas, the author of the *Remarques sur la langue française*, contributed more than any other to this work Among the other original members of the Académie are Conrart, its first president, the poets Chapelain, the real sponsor of the famous three unities in French tragedy, Maynard, and Racan, the faithful disciple of Malherbe, Balzac and Voiture, and Furetière, who was expelled for having published a dictionary before that of the Académie

The great authority in literature, however, was neither the Hôtel de Rambouillet nor the Académie, but Boileau, who with an undeniable critical talent made and unmade reputations at will, seldom going astray in his judgments Like Malherbe, he formulated in his *Epîtres* and in his *Art poétique* a code of literature, whatever did not meet its requirements was pitilessly condemned Poets like Théophile de Viau and Scarron, the creator of the *genre burlesque* (*Virgile travesti*), are among his victims He had nothing but contempt for Ronsard and his school, and yet he himself accepted the ancients as the criterion of excellence and even became the chief advocate of classicism in the great "querelle des anciens et des modernes," which raged through many years of the seventeenth century, while Perrault, who had started the debate, was the principal representative of the "modernes" Proceedings of so imperious a character were only the application to the field of literary criticism of the principle of authority which regulated the whole life of the seventeenth century, social, ethical, religious, artistic If France received strong political unity at the hands of Richelieu and Louis XIV, it was at the expense of that individuality which had characterized so many authors of the anarchistic sixteenth century Protestantism had been crushed out, not so much on account of its intrinsic defects as by reason of political necessities Bossuet was really the incarnation of his century in literature, the authority of God, the authority of the Church, the authority of the King, are the themes of his works, and the grandeur which cannot be denied to this epoch can be seen in each sentence written by the "aigle de Meaux," whether in his splendid *Oraisons funèbres*, *Sermons*, and *Discours sur l'histoire universelle*, in which the great of this world are like dust before God, or in his *Histoire des variations des églises protestantes*, and his attacks on Fénelon and Quietism, in which he affirms the absolute control of truth by the Roman Catholic church, or yet again in his *Déclaration du clergé de France*, in which he defends the claims of the Gallican church to certain liberties from papal jurisdiction The same is true of his contemporary Bourdaloue, even more famous than Bossuet in those days for his pulpit eloquence, and, though to a less degree, of Fléchier Even Fénelon, "le cygne de Cambrai," by humbly accepting the condemnation by Rome of his *Essais sur les maximes des saints*, showed how deep-rooted the idea of social and ecclesiastical hierarchy was in the temperament of that remarkable epoch He had also to learn by bitter experience what it cost to suggest (in the *Voyage de Télémaque*, written for his royal pupil, the Dauphin) modes of government which did

not agree with the autocratic ways of Louis XIV

In the drama the notion of authority takes a somewhat different form, but is as much emphasized as in Bossuet Corneille's tragedies, *Le Cid, Horace, Cinna, Polyeucte,* and his comedy *Le menteur,* preach an unconditional surrender to the laws of honor and conscience, of God and the state Racine, though his artistic tact raised him in many respects above the narrow spirit of his age, is not free from it, nevertheless, as is well shown in his fundamental thesis of the submission of man to his passions (*Andromaque, Phèdre, Iphigénie, Bérénice, Britannicus*) and in his illustrations of the omnipotence of God in his later religious plays, *Esther* and *Athalie*

There are, however, a few men in the seventeenth century who do not assume this attitude of deference to conventional grandeur and worldly power Chief among these is Molière (pseudonym for Jean Baptiste Poquelin), who attacks in his comedies, on the one hand, the *idola fori* of his contemporaries, as, e g, the current affectations of the society of his day (*Précieuses ridicules, Femmes savantes, Bourgeois gentilhomme*), and the false erudition of scholars, especially ignorant physicians (*L'Amour médecin, Médecin malgré lui, Malade imaginaire*), and, on the other hand, the general views of humanity, as in *L'Avare, Tartufe* (religious hypocrisy), *Don Juan* (affectation of unbelief), and *Le misanthrope,* his masterpiece

Descartes refused to accept the traditional Catholic foundations of metaphysics He invented a system of his own, resting on the proposition "Je pense, donc je suis" (I think, therefore I am), but he had to take refuge in Holland, in order to complete and give free expression to his new philosophy—a creed not so different from the orthodox as might be imagined if we were to form our judgment solely from the negative part of the doctrine (*Discours sur la méthode, Méditations philosophiques, Principes de philosophie, Traité des passions de l'âme*) Descartes was also a great writer, whose clear and concise style introduced what the French call *le langage de la philosophie,* and whose Cartesian school definitely established the cold authority of untrammeled reason in this century Thanks to a most cautious and subtle way of expressing himself, Malebranche, Descartes's pupil, was able to publish with impunity his long treatise *De la recherche de la vérité* In the line of theology the whole group of the Jansenists, who resembled in some respects the Protestants, especially in their hostility to the teachings of the Jesuit Order, was subjected to persecution They produced some of the most powerful and original writers of the time—Antoine Arnauld, Pierre Nicole and, above all, Pascal, who has often been called the most profound of French thinkers His literary bequest is the *Pensées* (notes prepared for a work in defense of the Christian religion and published after his death) and the *Lettres provinciales,* a most forcible and effective satire on the Jesuits Among the moralists of this epoch are La Bruyère (*Les caractères, Pensées*) and La Rochefoucauld (*Maximes*), better described perhaps as clever piecemeal psychologists than as powerful ethical philosophers Madame de Maintenon, in her letters, deals chiefly with problems of education

La Fontaine, whom his contemporaries nicknamed "Le bonhomme," is a writer of marked originality In his charming *Fables* and in his *Contes* (which remind one in their substance and form of the old *fabliaux*) we have once more a representative of the genuine "esprit français" as it existed before the Renaissance He had fed on all the poetic treasures of antiquity that came in his way and created them, as it were, anew, by his graceful, light, and artistic verses

Another man who freed himself from the conventionalities of the seventeenth century, and restored the connection with the national artistic tradition of France, is Charles Perrault, the author of the naive and humorous nursery tales His *Contes* found hosts of imitators, even late into the eighteenth century.

The numerous novels of this period also indicate a revival of the literature of the Middle Ages, particularly in the style of the *Roman de la rose.* But the reconciliation of natural feelings and conventionality is here far from being so complete as in the writings of the two authors just mentioned The lack of harmony between the two tendencies is disagreeably in evidence in all these tedious novels, many of which extended to 10 volumes The only outcome of their efforts is an intolerable sentimentalism expressed in the exasperating jargon of "précieuses," who play their parts in the garbs of shepherds and shepherdesses Let us mention only La Calprenède, and Honoré d'Urfé (*L'Astrée*), and Mademoiselle de Scudéry (*Le grand Cyrus, Clélie*), who invented the *carte du tendre* (map of tender feelings) and did in prose what Racan in his *Bergeries* had done in verse and in drama The first example of the French novel, in the modern sense of the term, is Madame de la Fayette's *Princesse de Clèves,* but it stands by itself Coarseness disfigures Cyrano de Bergerac's satirical *Histoire comique des états du soleil et de la lune* and his comedy *Le pedant joué* Scarron's *Roman comique* is a faithful picture in the form of fiction of an actor's life in the century of Molière Furetière furnished one of the first realistic novels in *Le roman bourgeois*

The memoir literature continues to enjoy favor in France and to show the real nature of things behind the wings of this century's plastic scenery of dry reason and platonic loves La Rochefoucauld and the Cardinal de Retz are the two best representatives in this field at this time

We reach the threshold of the eighteenth century with the *Mémoires* of Saint-Simon, who portrays in a lively style the still brilliant but now thoroughly corrupt court of the last years of the "Roi Soleil" Although rotten at the core, so strongly organized a society as that created by Richelieu and Louis XIV could not fail to hold together for a time, and, until far into the eighteenth century, we have nothing but a servile imitation of the seventeenth century But after 1750 literature becomes frankly an instrument of propaganda, which will ultimately destroy the existing political, social, and religious powers Regnard and Dancourt are imitators of Molière, Crébillon takes up the bequest of Corneille and Racine, Chamfort and Rivarol once more echo the spirit of the "précieuses", Florian sometimes reminds one of La Fontaine, Massillon follows in the steps of Bossuet, and D'Aguesseau is a master of pompous style in political eloquence. J B Rousseau and his disciple Lefranc de Pompignan are lyric

poets whose writings are in the style of the earlier century, the same is true of Louis Racine, the son of the great dramatist, and also true perhaps of Gilbert, it is only at the end of a life which spanned the century that even Fontenelle learns to appreciate the aspirations of the new generation in his work of popular science, *De la pluralité des mondes*, and inaugurates the art of interpreting in simple attractive style the results of philosophy and science for the general public The works of other secondary authors, although sprightly and witty, hardly contributed anything towards progress in literature and art Among them are Marivaux, who wrote exquisite comedies, Piron, Gresset, even Nivelle de la Chaussée, with his *comédie larmoyante*, and Ducis, who tried to introduce Shakespeare into France At the same time there are on the stage a few plays which announce clearly enough the times that are approaching Le Sage, in his bitter *Turcaret*, and Destouches, in *Le glorieux*, expose the moral unworthiness of those who claim to rule over their fellowmen by divine right, while Diderot, in *Le fils naturel*, Sedaine in *Le philosophe sans le savoir*, and Beaumarchais in *Figaro*, already affirm deliberately the merits of the bourgeoisie Diderot in his dramatic writings was the originator of the *comédies sérieuse* and the melodrama, which received their greatest element, pathos, from the *Comédie larmoyante* of Nivelle de la Chaussée In his drama *Charles IX, ou L'Ecole des rois*, M J Chénier directly attacks monarchy as a system of government And soon after, the brother of the latter, Andre Chenier, strikes his lyre in favor of the newly conquered liberty, he was, however, to pay with his head for the indignant and patriotic protests that he uttered in his *Iambes* against the horrors of the Terror. Three other descriptive poets, contemporaries of Chénier, call for a passing mention here—Delille (for his poem *Des jardins*), Lambert (*Les saisons*), and Roucher (*Les mois*) The gospel of tolerance gains ground daily, thanks to works like Le Sage's *Gil Blas* and Marmontel's *Contes moraux, Bélisaire*, and *Les Incas*, in the domain of the novel, while men like the Abbé Fleury and Rollin in education, and Vauvenargues in ethics, slowly and quietly suggest positive reforms

If the list of highly talented men in the eighteenth century is very long, that of writers of real genius is short, as compared with the preceding period. At the opening of the century there is Bayle, the scholarly and bold author of the *Pensées sur la comète* and of the *Dictionnaire historique et critique* As early as 1697 all the traditional doctrines that will be swept away by the Revolution are made a target for his dialectic, and many new ones are announced He was a precursor of Voltaire and especially of the Encyclopédistes, who used his indirect method of attack against the absolutism of religious doctrines Besides the advantage of a timely appearance, Voltaire had the considerable advantage of a clear and beautiful style. He is the incarnation of the eighteenth century In one part of his work, nevertheless, Voltaire plainly belongs to the group of continuators of the traditional and classical literature. His dramas, except a few like *Mahomet* (preaching tolerance), which betrays the age in which its author lived, are patterned exactly after those of the seventeenth century, his *Henriade*, an epic poem, is another specimen of a literature that belongs still more surely to the past, and the *Siècle de Louis XIV* is the glorification of that France whose standards of life he contributed to tear down in so many other writings In the *Essais sur les mœurs et l'esprit des nations* he takes up history at the point where Bossuet had left it in his *Discours*, viz, with Charlemagne, but while Bossuet had shown that Catholicism is the great leading power of a progressive world, Voltaire attempts to prove that this sect is the mother of all crimes and has positively prevented progress Voltaire's criterion was plain common sense, and from this stronghold he attacked indifferently the methods by which he considered that the Church took advantage of the imbecility of human nature (*Lettres philosophiques*), the theistic and optimistic systems of philosophers and theologians, particularly the doctrine of the best possible world of Leibnitz and Shaftesbury (his poem *Le désastre de Lisbonne*, his *Contes philosophiques, Candide, Zadig*), and the men who deny the existence of God (Si Dieu n'existait pas, il faudrait l'inventer) His God, however, is only that of deism, i e, a Creator who does not interfere with his creation, in other terms, he does not believe in Providence Voltaire's action and influence are essentially negative But, nevertheless, his universality of interests, his quick response in favor of one cause or another, especially toleration and justice, have earned him the title of father of French journalism The only part of his work in which he does not attack others is that in which he tries to spread the scientific ideas acquired in his sojourn in England, especially those derived from Newton's books

It is from England also, from the empirical philosophy of Bacon and of Locke (whose principal disciple in France was the Abbé Condillac), that the group of writers known as "le parti des philosophes" borrowed the new conception of the world that they substituted for the traditional philosophy, which they had rejected They embodied the results of their common efforts in the *Encyclopédie* Diderot, who, though somewhat capricious, was one of the profoundest writers of the time, made this undertaking the work of his life, enrolling his most distinguished contemporaries as his collaborators D'Alembert the mathematician wrote the *Discours préliminaire*, which established his fame as a writer It is impossible to mention all those who were connected with the *Encyclopédie* and the "parti des philosophes" It is enough to name Mably, Raynal, Grimm, Helvétius, Holbach, and Condillac The salons of the time, conducted by a number of very keen and intelligent women, did much to spread the new beliefs In the field of sociology and politics the most important writer is the Baron de Montesquieu He began with a most happy and brilliant criticism of the customs of his countrymen in the *Lettres persanes* Later, in the *Considérations sur les causes de la grandeur des Romains et de leur décadence*, and in his more elaborate work, *L'Esprit des lois*, he does away with the merely speculative and a priori method of Bossuet in treating the philosophy of history and replaces it by the empirical and comparative method which has since been applied with greater thoroughness, but not with greater skill or attractiveness, by modern ethnologists and sociologists.

The most far-reaching in its consequences of the philosophical principles of the eighteenth century was the return to nature The affected cult of an unreal nature as it was found in the novels of the "précieuses" had to go, and if we find an echo of it in Marie Antoinette's *hameau* at Versailles, no author of mark in the eighteenth century makes use of this old ideal In 1735 the Abbé Prévost offered a first example of natural and passionate love in his novel *Manon Lescaut*, and a few years later the great naturalist Buffon proved that even in the society of the nobles a more truthful conception of nature was not excluded a priori He had a mind of a most aristocratic form and in his style continued the great traditions of the writers of the "siècle de Louis XIV," yet he devoted his life to writing a monumental work, entitled *Histoire naturelle*, in which the nature that he studies with enthusiasm is one created by God and not the one invented by ladies and gentlemen of the court Most of his opinions are no longer accepted, but they were original at the time and well calculated to foster interest in a subject so long neglected by philosophers and scholars Of a somewhat different character, but just as strong and sincere, was the love for nature as it appears in Bernardin de Saint-Pierre's *Etudes sur la nature* and *Harmonies de la nature* and in his romantic idyll *Paul et Virginie* Then came an eccentric and restless genius, Rousseau, who provided not merely most of the ideas which the Revolution tried to put in practice, but also many of those that have been elaborated one by one in the literature of the nineteenth century by the Romantic and even by the Realistic schools Extreme in everything, he wrote with an enthusiasm which could not fail to stir a society that had grown accustomed to hear only the dispassionate and cold speech of common sense and dry reason Endowed with a strange combative disposition, he never rested till he had reached the very roots of the evils of his day, he was not content to attack any particular institution, Church, monarchy, or class privileges, his attacks were directed against society as a whole, and he declared the very system of civilization to be rotten, false, and contemptible That man is a creature of nature, and that therefore nature must be his teacher, his mistress in everything, was with him a fundamental axiom If he tore down in his *Discours sur les sciences et les arts*, *Discours sur l'inégalité*, *Lettres sur les spectacles*, he tried to reconstruct in the domain of education (*Emile*), in that of the family (*Nouvelle Héloise*), and in that of sociology (*Contrat social*) The last mentioned is a treatise in which the author endeavors to trace the origin of every organized society to an original though tacit contract between all citizens; the latter freely decide as to the government they want This implies not only taking away from the dominant class its privilege of ruling, but also the power of appointing and dismissing magistrates at will. The *Contrat social* became the Bible of the French Revolution, this was the authority to which it appealed when it justified the beheading of Louis XVI So did his *Nouvelle Héloise* and his *Confessions* strike the purely personal and lyrical note which inspired the Romanticists to dwell on the ego and its various moods

When the destructive storm of the great Revolution was over, Frenchmen realized that it was easier in theory than in practice to change an organization rooted in the tradition of hundreds of years Accordingly the first years of the nineteenth century appear as a period of reaction against the Revolution in the field of literature as well as in the field of politics Joseph de Maistre preached in beautiful language on the unconditional return to the old regime, nay even to a mediæval theocracy The belief in Providence was according to him the only satisfactory philosophy, the Church must rule over Europe, and kings be considered as the sacred representatives of God Chateaubriand, though Catholic and Royalist, takes into consideration more than De Maistre the events of the eighteenth century In his *Essai sur les révolutions* he maintains the uselessness of revolution, and later, having undergone terrible personal sorrows owing to the cruelties of the Terror, he finds consolation in the Christian faith ("J'ai pleuré et j'ai cru") The *Génie du Christianisme* written soon after, offers a kind of æsthetic religion for artists rather than a religion for humanity at large Yet it enjoyed an immense success with his contemporaries, who were tired of negations and greeted with enthusiasm the old belief—even though in a somewhat unusual attire Chateaubriand, however, is not entirely reactionary, he proves a true son of the end of the eighteenth century when, after his journey to America, he professes a warm admiration for the life of the uncivilized tribes he had visited and for the grandeur of the scenery (*Les Natchez*, *Atala*) He is also a forerunner of the Romanticists in his half-autobiographical story *René*, which, with *Obermann* by Senancour and *Adolphe* by Benjamin Constant (the great orator of the Restoration), correspond in France to the note struck in Germany by Goethe's *Werther* Madame de Stael's great achievement was the reestablishment of the connection with the eighteenth century, and especially with Rousseau In *L'Allemagne* she advocates the natural and rationalistic religion of Rousseau's *Vicaire Savoyard*, the same work brings out the idea of cosmopolitanism in the intellectual sphere of life which is to be found already in germ in Rousseau, and which prompted her to reveal the genius of Germany to her countrymen Her two novels, *Corinne* and *Delphine*, defend—like the *Nouvelle Héloise*—the natural rights of love as against the conventions of social life The Romantic movement, which has also been traced back to Rousseau, is the most important literary event of the nineteenth century Its purest product is Lamartine Individualism had won the great battle begun a hundred years ago the *Méditations poétiques* and *Harmonies poétiques et religieuses* are like a glorious cry of victory crowning the efforts of the eighteenth century No bitter experience had revealed as yet the deception that awaits the self-worshiper One would wish that Lamartine had died before he descended from the heights into the arena of political intrigues and soiled his lofty aspirations by contact with reality. His political career was a failure, though—or perhaps because—he was sincere

Very soon, taking advantage of its first successes, Romanticism assumed an aggressive attitude towards Classicism Victor Hugo became the leader of the new school and was joined by Gautier, Sainte-Beuve, Vigny, Musset, Nodier. The great battle by Hugo himself in favor of

Romanticism took place on the stage (*Cromwell*, with its important preface, *Hernani*, *Ruy Blas*, *Marion Delorme*, *Le roi s'amuse*) Alexandre Dumas, the father, and Vigny (in *Chatterton*) supported him The old school, however, regained a temporary popularity with Ponsard's *Lucrèce*, a play weak in itself, but put upon the stage at the psychological moment when the enthusiasm of the public for Romanticism was beginning to cool The triumph of Romanticism, with its undue insistence on local color, its exaggerated mysticism, and its undiscriminating disregard for all restraints of classicism, was in any case of short duration Some of the most prominent writers of the group quietly withdrew (Sainte Beuve, Gautier), while others loudly voiced the bitter disillusion The pessimistic but proud poetry of Vigny (*Poésies*) and the tragic youthful outcry of despair of Musset (*Les nuits*, *Souvenir*) are the swan songs of Romanticism In the domain of fiction the passionate prose of the anarchistic George Sand (*Indiana*, *Jacques*, *Mauprat*) gradually lost its fervor, and in later years she abandoned the fanaticism of her youth and sought the harbor of happiness in an old-fashioned, conventional society

Ever since the Restoration France has been in danger of a new era of revolutions, and the possibility of having to face another Terror led many to attempt a pacific settlement of the rising social and political difficulties Among them were the poets Béranger and Casimir Delavigne, the political writers and orators P L Courrier, Benjamin Constant, Royer-Collard, Lamartine, the historians Guizot, De Tocqueville, Thiers, Blanc, Michelet, the philosophers Cousin, Jouffroy, the Socialist Proudhon, the Catholic writers Lacordaire, Lemennais, Montalembert All the generous efforts of these men were finally brought to an end by the revolution of 1848, followed three years later by the coup d'état of Napoleon III

In the meantime Victor Hugo's fame continued to increase He was a giant well able to stand the final failure of Romanticism without being carried away in the disaster Moreover, his conception of individualism had always been very different from that of Lamartine, Vigny, and Musset, and his understanding of the needed reaction against Classicism was more radical, more to the point, and also more according to the trend of ideas since the Revolution Hugo, now the high priest of the nineteenth century, had endeavored to show that man is a tissue of contradiction, a mixture of good and evil, of beauty and ugliness, of grandeur and villainy, with the inference that a king or a nobleman has traits that make him, after all, a very inferior being, while—and this is the chief point—in the humble, the lowest in the social scale, are intimations of sublimity that render him the equal of the most highly honored among men. See particularly the dramas *Le roi s'amuse*, *Marion Delorme*, the novels *Bug Jargal*, *Notre Dame de Paris*, *Les misérables*, and, in the *Légende des siècles*, poems like "Les pauvres gens" or "Le crapaud" Not only are those traits not distinctly romantic, they are even characteristic of the school that was to replace Romanticism, viz, the Realistic Another important feature that made Hugo a favorite with the masses is his optimism Though a great satirist in *L'Année terrible* and *Napoléon le petit*, his confidence in humanity and God was always predominant This is, among others, the idea which inspires the whole *Légende des siècles*, poems in the epic style, in which the author wished to show how humanity rises constantly from a lower to a higher level of civilization and happiness

Two other men in the first half of the century took pains to study man under both his ideal and his baser aspect, but, contrary to Victor Hugo's, their portrayals of characters have a pessimistic tone The first of these is Honore de Balzac, who in his stupendous *Comédie humaine* is so anxious to remain faithful to life that, for fear of incurring the accusation of undue indulgence, he shows a strong inclination to lay stress on the weakness of man He is the great master of the realistic novel in France The titles of his best-known novels are *César Birotteau*, *Eugénie Grandet*, *Le lys dans la vallée*, *Peau de chagrin*, *Le père Goriot*, *Séraphita* The second was Stendhal (pseudonym of Henri Beyle), who in his detailed studies of the psychological springs of human action (*Chartreuse de Parme*, *Rouge et noir*) seems to have still more deliberately assumed the cynical tone of skepticism as to the very possibility of goodness The public was not ready for Balzac and Beyle, and a whole generation was to pass away before their efforts were duly appreciated The old standards had first to be disposed of, and this was the task performed by men like Mérimée, Flaubert, Gautier, Barbey d'Aurevilly, and the poet Baudelaire In turn bitingly sarcastic and humorous, they indicated the shallowness and pettiness which the advent of the bourgeoisie had introduced into art Flaubert, D'Aurevilly, Mérimée, and Gautier still select the characters of their stories for the most part in the sphere of the romantic, but the method of treatment is evidently realistic Flaubert's *Madame Bovary* (1857) is in subject and treatment the first great novel of the Naturalistic movement of the third quarter of the century The victories of science and the success of pessimistic philosophy did much to promote the ultimate triumph of the cause of Naturalism In the seventies Zola published the first novels of his series *Les Rougon-Macquart* The subtitle of the work, "Histoire naturelle et sociale d'une famille sous le second empire," is suggestive enough To the author, and to the brothers Goncourt, who immediately preceded Zola in this newly opened path, man is a mere product of his *milieu* and of the physical laws of nature, especially those of heredity, therefore he can be understood only by means of scientific study, and true literature must be nothing but a collection of scientific cases carefully recorded Zola was himself the disciple of the philosopher Taine, who had put forth the principle of his system in the introduction to his history of English literature But Zola had taken only one-half of the theory, laying stress merely on the physiological causes that influence action, another disciple of Taine, Paul Bourget, studied in his novels particularly man's mental mechanism, as Beyle had done earlier, and represents the "roman psychologique," as Zola the "roman naturaliste" Bourget was attracted by the study of the female character on account of its complexity, for the same reason he deals by preference with society women rather than with women of the people His most characteristic novel is *Le disciple*, see also *Mensonge*, *Cœur de femme*, *Cruelle énigme*, *Duchesse bleue*

Two of the principal writers in the two domains of the naturalistic and the psychological novel are the genial Alphonse Daudet and Edouard Rod They allow a touch of human feeling to animate their books, and therefore, although in some respects perhaps inferior from the artistic point of view, enjoy much favor with the bulk of the public It is not always possible to decide whether an author belongs to one or the other of these two schools, this is, e g, the case with Ferdinand Fabre and with novelists like Edmond About or Cherbuliez The extreme theories of Naturalism were soon given up Five disciples of Zola—Rod among them—published a protest against their former master's conception of literature Zola himself, in his *Trois villes* (Lourdes, Rome, Paris), renounced his pessimistic views of humanity, and in his four *Evangiles* (*Fécondité, Travail, Vérité, Justice*), of which only three had been written at the time of his death, the note of optimism and even of utopianism is dominant If Naturalism has died out, it has, however, left noticeable traces in the works of novelists up to the opening of the twentieth century The brothers Rosny and the brothers Margueritte are almost direct descendants of Zola, with a slightly more pronounced tendency towards moralizing, while Maurice Barrès and Paul Adam and L Descaves discuss not only social but political issues Again, a tendency to use the psychological method is manifest in authors like Prévost, "Gyp," Estaunié, Mirbeau, and Hervieu Theuriet, Bazin, and Pouvillon are realistic novelists of rustic life The master of the naturalistic short story is Guy de Maupassant His sober style seems to be an improvement even upon that of Mérimée, who was usually considered the incomparable model in this field The stories of Coppée may be mentioned here as belonging to the realistic style, tempered by deep sympathy with the working classes The names of Villiers de l'Isle Adam, Rémy de Gourmont, P Louys, and De Régnier offer the best examples of novels written by the modern Symbolists

As to the stage, since the fight of Romanticism we record the appearance of the prolific Scribe, and the original note struck by Alexandre Dumas, the son, and E Augier, in their realistic and at the same time hortatory social dramas (*Dame aux camélias, Demi-monde, Fils naturel, Affaire Clémenceau*, by the former, and *L'Aventurière, Le fils de Giboyer, Maître Guérin*, by the latter) They were the forerunners of realism in the drama For years Labiche, Sardou, Meilhac, Halévy, and Pailleron contrived clever novelties to amuse the stage goers Meanwhile the theatrical ventures of Zola and Daudet had failed, and it was not until 1882 that Naturalism scored a triumph with *Les corbeaux*, by H Becque The success was, however, of short duration, for Naturalism degenerated soon into what has been called "le théâtre rosse" Since that time all sorts of plays have appeared on the Parisian stage—satirical by Lavedan and Donnay, social and moral by Curel, Hervieu, Brieux, and Mirbeau, the author of *Les affaires sont les affaires.* E Rostand's *Romanesques* was a belated satire on Romanticism, in *Cyrano de Bergerac*, his greatest success, the satiric and serious elements are mixed in a most disconcerting manner, while *L'Aiglon* is a more or less happy attempt at historical drama (a genre cultivated also by Hennique, Coppée, and Sardou), in *Chantecler*, he attempted a revival of the *bel esprit français* which was less fortunate The best among contemporary comic authors are Capus and Courteline Finally, we should mention a group of artists specially characteristic of an epoch in which antinaturalism is the dominant note, the Symbolists Villiers de l'Isle Adam, Saint-Pol Roux, P Claudel, and, above all, Maeterlinck The latter, however, has entered a more usual path in his *Monna Vanna* (1902) A resurrection of the Middle Ages, fashioned on its miracle plays, also took place on the eve of the twentieth century, with M Bouchor and Vicaire, the *Théâtre de l'Ame* by Schuré, also has a half-mystical note

The poetry of the last third of the nineteenth century illustrates remarkably well the oscillations of the literary ideals during this period. The spirit of Naturalism made a deep imprint on the devotees of the Muses known as the *Poètes du Parnasse*, or *Parnassiens* Banville and Th Gautier insisted, above all, upon a very accurate and, in appearance, scientific verse construction, a pornographic inclination is evident in Baudelaire's *Fleurs de mal*, a pessimistic note in Leconte de Lisle, and a psychological tendency in Sully-Prudhomme, while one notices in Coppée, Richepin, Mendès, the general desire to draw on the lower classes of society for artistic material Only 15 years after the publication of the first volume of the Rougon-Macquart series and 20 after the foundation of the Parnassian group, a host of new authors came to the front and spared no efforts to shake off the yoke not merely of the poets of the time, but of Naturalism itself Some of these men, though essentially poets, wrote at times in prose They called themselves *Symbolistes*, or sometimes *Décadents*, which title, however, was originally a nickname Instead of looking at things as the Realists had done, they declared that the world is essentially a subjective creation, and that therefore objects and thoughts are better represented and conveyed by means of symbols than by an accurate description. The true field for art is not reality, but the sphere of mobile, subtle sensations and feelings. Symbolism is individualism carried to its extreme limits They adopted a special vocabulary and a special system of versification The latter culminated in the *vers libre*, i e, the verse where nothing but the artistic feeling of the poet decides as to rhythm, number of syllables, and rhyme The Symbolists recognized as their leaders Paul Verlaine and Stéphane Mallarmé, both of them former adherents of the Parnassian school, the best known are, besides the two already mentioned, Rimbaud, H de Régnier, Viele-Griffin and Stuart Merrill (both American by birth), J Laforgue, J Moréas, G Kahn, R. Ghil, Paul Fort An important group flourished in Belgium, Maeterlinck, Verhaeren, and Rodenbach being the chief members In some prose authors, such as Huysmans (a former pupil of Zola), and the Sar Peladan, who has created the Order of the Chevaliers de la Rose Croix, related tendencies have assumed the character of a vague artistic mysticism These authors never succeeded in altogether gaining their point, the mass of the public being unable to follow them in such esoteric compositions Therefore the next move was a return to theories more accessible to the average mind Groups of young poets—one in Toulouse, the other in Paris—have led the

way in this new direction They are known under the name of *Naturistes* They speak highly of Zola; but while his attitude towards nature was purely scientific, they endeavor to bring out also its poetical aspects There is nothing new in this vague pantheism itself, however original it may look after the extreme tendencies of Naturalism and Symbolism Saint-Georges de Bouhélier, M le Blond, and L Balzagette are the principal Naturistes Another group of 17 authors was formed still later, their ideals are the same as those of the school just mentioned, but they are more mature poets Their first manifesto was issued in the fall of 1902 It is a collective publication *Les poètes de l'école française, la foi nouvelle* Another group of ultrasubjectivists, inspired by the Futurist painters, have tried, under the leadership of Marinetti, a Franco-Italian poet, to form a new school of political expression, but up to 1914 they had made little headway

Thus the swing of the pendulum becomes quicker and shorter as sects and schools spring up and die away In reality the twentieth century opens without any prevalent literary ideal, it cannot be said, however, that any kind of artistic manifestation is altogether lacking The most representative Frenchmen at the close of the last century seem to be the novelist P Loti, with his vague impressionism, and Renan and Anatole France, whose chief characteristics are a refined dilettantism and amiable skepticism The advent of a great literary genius is yet to be recorded for the twentieth century It seems that the present-day brilliant but secondary authors are still showing signs of the influences of Tolstoi, Ibsen, and Dostoyevski Impartial critics, however, believe that the radical writers are losing some of their vigor, while a certain vague religious mysticism appears to become more and more frequent in contemporary literature, under the guise of a rather opaque symbolism

History in the second half of the nineteenth century assumed a more and more scientific form of treatment, with Fustel de Coulanges, Renan, Taine, Lavisse, Sorel, and it is considered by many, probably with reason, as belonging no longer to the domain of literature The same question has even been raised with regard to criticism Since the admirable work of Villemain, D Nisard, and especially Sainte-Beuve, there has been a strong inclination towards scientific criticism. Taine, and with a kind of fanaticism Hennequin, systematized it to such an extent as to make it render well-nigh automatic judgments The reaction was not long in setting in The two methods in vogue in the last decade of the nineteenth century were that of the dogmatists, like Brunetière and Doumic, who judge works of literature according to their agreement with an objective canon, and that of the impressionists, like Lemaître and A France, who allow themselves to be guided solely by their subjective feeling of the beautiful Critics such as Faguet, Larroumet, Lanson, Pellissier, may be called intellectualists, they aim at impartiality and support their opinions with rational motives. Among the rising stars in criticism in the first years of the twentieth century must be mentioned C Mauclair, and A. Beaunier, for their openness to new ideas, and E Charles for his energetic and independent criticism This department may turn out to be the most important contribution of this century in the domain of ideas The solidity of thought of this function of literature is in great measure due to the scientific methods of modern philology, initiated by Dietz and other great scholars, whose example was admirably followed by Fauriel Filon, Gaston Paris, Paul Meyer, and more recently by Joseph Bédier

We ought to speak before ending of a deep but almost unconscious conflict, independent of any artistic standard, between two classes of authors—those who endeavor to make literature conform to the tastes of the masses, thus yielding to the democratic spirit of the nineteenth century, and those who try to resist these efforts Authors like Hugo have been frequently accused of pandering to the popular taste The great successes in this lower order of literature have lain in the domain of the novel Foremost in this style is Dumas, the elder, whose *Monte Cristo* and *Three Guardsmen* are familiar to all English readers Next to him, though not so famous, are men like P de Kock, E Sue, A Karr, Ponson-du-Terrail, Gaboriau, Richebourg, X de Montépin, Saintine, Souvestre, O Feuillet, and G Ohnet

On the stage a deliberate step towards popular art has been taken by M Pottecher, who created in 1895 his "Théâtre du peuple" at Bussang, in the Vosges He has found many imitators at Gérardmer, Ploujean, Béziers, and other towns of France

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FRENCHMAN BAY An ocean inlet in Hancock Co, Me (Map Maine, D 4) The bay proper is about 10 miles long and has an average width of about 4 miles Mount Desert Island forms the western side of the bay, and Bar Harbor, the most prominent resort on this island, is situated on its shore It furnishes numerous good harbors, and contains a number of islands, chief of which are Porcupine, Iron Bound, Jordan, Stave, Calf, and Hancock islands

FRENCH MEASLES. See GERMAN MEASLES

FRENCH POLITICAL PARTIES See POLITICAL PARTIES, *France*

FRENCH PROPHETS A name given in England to certain Camisards (q v), who came thither from France in 1706, led by Marion, Durand-Fage, and Cavalier, making extravagant claims of prophecy, the gift of tongues, ability to work miracles, etc They preached communistic doctrines, announced the speedy coming of the Messiah's kingdom, and produced several books, among them *A Cry from the Desert*, by John Lacy (London, 1707) For a short time they gained converts, including some persons of influence Consult David Hughson (i e, Edward Pugh), *A Copious Account of the French and English Prophets* (London, 1814), Vesson, *Les prophètes camisards à Londres* (Paris, 1893)

FRENCH PROTESTANT CHURCH See HUGUENOTS

FRENCH REVOLUTION, THE The Revolution of 1789 in France which overthrew the Bourbon monarchy and the old feudal régime In this article the name is employed for the period of French history beginning with the meeting of the States-General at Versailles, in 1789, and ending with the establishment of the Consulate, in 1799 For an account of the condition of France before the Revolution, and the causes that brought it about, see FRANCE

When it was decided to summon the States-General, two important constitutional questions required solution—the distribution of representation among the three orders, and the method of voting in the States-General itself Owing to the somewhat irregular character and procedure of this body, which had not met since 1614, there were no valid precedents which could be followed in 1789 In solution of the first question, a royal decree revived or created certain electoral divisions and provided for the election of 250 delegations of four members each—one from the nobility, one from the clergy, and two from the Third Estate—thus dividing the membership of the States-General equally between the two upper orders and the Third Estate Supplementary decrees provided for special cases which arose and considerably increased the number of members In each electoral district, in conjunction with the election of the members of the States-General, each of the three orders drew up *cahiers*, or lists of grievances, including propositions for new legislation The question of the method of voting was not solved, but the official expectation was that the vote would be by order, which would have required a majority vote of each of the orders to pass any measure This would have been a bar to any vital measure of reform The Third Estate, however, expected and intended to have a vote by head, i e, the three orders should vote as one body, and the

simple majority should suffice to pass any measure This would have placed the control in the hands of the Third Estate, which would vote as a unit and could depend upon the support of a few liberal nobles and the considerable number of parish priests among the representatives of the clergy When the States-General met, the nobility and the clergy organized as separate houses, but the Third Estate refused to take any such action, in spite of royal and ministerial pressure, and finally on June 17 declared themselves the National Assembly and invited the nobility and clergy to join the Assembly When the Third Estate first met on June 20, they found their meeting hall closed, but secured a place of meeting in the building called the Tennis Court (*jeu de paume*), where they took the famous oath not to dissolve until they had given France a constitution The parish priests, or *curés*, and a few of the liberal nobles then joined the Third Estate After the fruitless royal session of June 23, in which the King commanded the three orders to meet separately, the remainder of the nobility and clergy, at the royal bidding, joined their fellows in the National Assembly, which came to be called the Constituent Assembly, because of its self-imposed task of framing a constitution The leader of the Third Estate was Mirabeau (q v), an able but discredited noble who had secured an election as a representative of the Third Estate for Aix

In July, under the influence of a few ultra-conservative and reactionary members of the royal family and of the nobility, the King assumed a hostile attitude, dismissed Necker, the Minister of Finance, in whom the hopes of a regenerated France largely centred, and concentrated troops on Paris Insurrectionary movements, by which the masses of the people began to show their interest, broke out in Paris Blood was shed in the capital on July 12, and on the 14th the Bastille (q v), the visible sign of generations of tyranny, was stormed and partially destroyed The propertied classes and the business people of the city, to prevent the recurrence of bloodshed and riot and to maintain order, organized a city militia, called the National Guard, and a provisional city government. The King, in alarm, withdrew the troops, recalled Necker, and in response to popular demand visited Paris, where he legalized the provisional measures and recognized Lafayette as commandant general of the New National Guard, and the astronomer Bailly as mayor of Paris, and changed the national colors from the white of the Bourbons to the new and popular tricolor

Having failed in their attempt to overawe the National Assembly and the people of Paris, the Count of Artois, the King's youngest brother, and other leading reactionaries left France, being the first of the so-called émigrés (q v) Immediately following the capture of the Bastille, local disturbances broke out in many sections of the country, while other parts were swept by a panic known as the "Great Fear" The old administrative machine had broken down, and the nation was without an effective local government In each locality the cool-headed lovers of law and order organized companies of the National Guard and established a provisional local administration

On the night of August 4 a report on the condition of the nation was read in the Constituent Assembly and it was followed by the abolition of the old feudal and manorial privileges The Assembly did not begin at once the necessary constructive work, but dallied with academic discussion on the rights of man, a declaration of which was adopted, to be a preface to the new constitution (See ASSEMBLY, NATIONAL) The King and his ministers failed to show any ability to deal with the crisis, while the attitude of the Queen and the court gave color to rumors and popular fears concerning the hostile designs of the King against reforms This period of suspense was ended by another outbreak in Paris A mob, composed largely of hungry women, after some disturbances in the capital, marched to Versailles on October 5, followed by Lafayette and the National Guard Lafayette rescued the royal family, but did not disperse the mob, and on the following day the National Guard and the mob escorted the royal family to Paris and quartered them in the Tuileries The Constituent Assembly soon followed and found a meeting place near the Tuileries Thus far the Assembly had been dominated by admirers of the English constitution, like Mounier and Mirabeau, and by admirers of America, like Lafayette and the Lameths Although there were some theoretical admirers of republican institutions, still, in practice, all had contemplated a constitutional monarchy for France Now the most conservative members of the Assembly began to disappear, and slowly more radical principles developed A symptom of this change was in the organization of clubs, the earliest and most important of which was the Society of the Friends of the Constitution, later known as the Jacobins (q v), from the old monastery in which its meetings were held The Jacobins became a great political force, because of their system of affiliated clubs in the provinces, with which they were in close communication (See FEUILLANTS, JACOBINS) Another important club in Paris was the Cordeliers (q v), under the radical leadership of Danton Newspapers as well as clubs sprang into existence in 1789, for the censorship ceased to discharge its functions These papers differed widely in form, regularity of issue, and character. In general their purpose was political, and most of the space was occupied with accounts of the sessions of the Constituent Assembly The most famous of the journals was the *Moniteur*, the most brilliant was the *Révolutions de France et de Brabant* of Camille Desmoulins, and the most erratic the *Ami du Peuple* of Marat On November 2 the Assembly decreed the transfer of the property of the church to the nation In February, 1790, it abolished succession by primogeniture In June it suppressed all titles of nobility

The work of drawing up the new constitution went on apace in the Assembly, so that the first draft was accepted by the King on July 14, 1790, the anniversary of the taking of the Bastille, at the Feast of the Federation in the Champ de Mars, in which representatives from all parts of the country participated The constitution gave the King a suspensive veto on all measures passed by the unicameral national legislature The legislature shared with the King the control of foreign affairs The most successful and most enduring portion of the new constitution was the provision made for the reorganization of France into 83 departments, each with its local administration All officials were to be elected by the people Another feature of the new arrangements was equally im-

portant because of the opposition which it aroused This was the civil constitution of the clergy, which reorganized the church upon the lines of the new civil administration and transferred the actual control of the church from the hierarchy to the French state The clergy were to be paid by the state and were required to take an oath to support the new arrangement This caused a schism in the church in France, because two-thirds of the priests remained loyal to the Catholic church and refused to take the oath The Assembly had already confiscated the estates of the church and issued assignats (q v), or a kind of government notes based upon these lands as security The confiscated lands, comprising one-fifth of France, being thus placed suddenly upon the market, depreciated rapidly in value, and the assignats, owing to new issues, declined more rapidly The only other important event of the summer of 1790 was the military mutiny at Nancy and its suppression by Bouillé (q v) on August 31 Necker, to whom, of all the King's ministers, the nation had looked for wise and able measures, failed to accomplish anything and retired from office in September, 1790, leaving the King without a single competent adviser Mirabeau was the one man in public life who possessed real statesman-like ability Though viewed with suspicion by his colleagues in the Constituent Assembly, and with unconcealed contempt by the Queen and the court, he attempted to place his talents at the service of the nation, through both the Assembly and the King Though his advice was not accepted, the nation realized that his death, on April 2, 1791, left France without a single statesman to guide her Worst of all, France was not to be allowed to solve her problems alone The Queen was in constant correspondence with her brother, the Emperor Leopold II, the ruler of the extensive Hapsburg dominions This was regarded by the people as treasonable Both Leopold and Frederick William II of Prussia regarded the events in France with suspicion and desired to save the French royal family from humiliation and possible danger German rulers had allowed the increasing numbers of the émigrés to gather within their territories and threaten armed invasion of France to rescue the royal family and restore the old order Contrary to the advice which Mirabeau had given, the King and his family escaped from Paris on the night of June 20, 1791, and fled towards the eastern frontier to take refuge with the émigres under the protection of the Emperor Leopold This confirmed the popular suspicion that the Queen was in treasonable correspondence with her brother, and that the King had perjured himself in swearing to support the new constitution The King and the royal family were halted at Varennes and brought back to Paris

The summer of 1791 witnessed two unfortunate events which foreshadowed the evil days to come The first was the unprovoked firing upon a popular meeting in the Champ de Mars, in Paris, on July 17—an event known as the Massacre of the Champ de Mars The other was the meeting at Pillnitz of Leopold II and Frederick William II in August, and the issue of a joint declaration intended as a warning to the popular party in France Meanwhile the Constituent Assembly had revised the constitution on more conservative lines and submitted the completed work, the constitution of 1791, to the King, who took the oath to it on September 14 A new legislature having been chosen according to the provisions of the new constitution, the Constituent Assembly dissolved on Sept 30, 1791

The new legislature, known in history as the Legislative Assembly, began its sessions on Oct 1, 1791 The Assembly was composed of about 750 members, chosen largely from the middle class, and included no one who had sat in the Constituent Assembly There were no organized parties in the Legislative Assembly, but two small groups, one liberal and one radical, early came into prominence—the Girondists (q v), so named because their leaders came from Bordeaux in the Department of the Gironde, and the Mountain, who took this name because they occupied the highest seats on the left side of the hall The majority of the members of the Assembly were moderates or even conservatives, but the Girondists were generally able to carry their measures Unfortunately the Girondists were theorists and orators and included among their number no person of statesman-like character Under the leadership of Brissot they became a republican party, and monarchy gradually became unpopular Differences in regard to the nature of the proposed republic later arose between the Girondists and the Mountain—the one desiring a federal republic like the United States, the other advocating a republic one and indivisible with a centralized administration The Legislative Assembly enacted stringent measures against the émigrés and the priests who refused to take the oath to support the civil constitution of the clergy Failing to see that France needed peace in order to complete the solution of her internal questions and to establish a stable form of administration, the Girondists after prolonged discussions secured the passage, on April 20, 1792, of the fatal act declaring war against Prussia and Austria

Lack of discipline was largely responsible for the failure of the French armies to keep the Austrians and Prussians out of France The advance of the foreign armies increased the unrest in Paris Small politicians began to form an organization to use the mob of Paris as a political force On June 20 they directed a demonstration by the mob, which resulted accidentally in an invasion of the Tuileries The knell of French monarchy had sounded King, ministers, and legislators sat helpless awaiting the final blow, while the leaders of the mob quietly but without concealment matured their plans They usurped the government of Paris, organizing a revolutionary commune Volunteers were sent to the armies, while others were brought to Paris from Brest and Marseilles, the latter entering Paris singing the patriotic hymn henceforth known as the "Marseillaise" On July 25 the Duke of Brunswick, who commanded the Austro-Prussian army which was preparing to invade France, issued a proclamation against the French Revolutionists which aroused the Parisians to frenzy On August 10 all was ready, and the revolutionary leaders struck their blow The Tuileries was stormed and the Swiss Guard was massacred The royal family took refuge in the hall of the Legislative Assembly, which suspended the King and placed the royal family under strict surveillance in the Temple. A national convention to revise the constitution was called, to be elected not on the restricted franchise provided in the consti-

tution of 1791, but by universal manhood suffrage Numerous suspects were arrested, and Danton as Minister of Justice acted virtually as dictator Lafayette in alarm abandoned his army and fled from France, but was seized and imprisoned by the Austrians Further losses on the frontier resulted in further disturbances in Paris, culminating in the massacres of September, during which about 1000 royalists and nonjuring priests in the prisons were slain by the mob Popular outbreaks also took place in some of the provincial cities The tide of disaster and disorder was stemmed by the news of the engagement of Valmy on September 20, between Kellerman and the Duke of Brunswick, who vainly cannonaded the French position On the same day the Legislative Assembly ended its sessions

The National Convention, composed of about 750 members, nearly 500 of whom were new men, met on September 21 and promptly showed its character by abolishing the monarchy and declaring France a republic The first weeks of the Convention were marked by the occupation of Savoy and Nice, the successes of the French armies on the Rhine, and the victory of Dumouriez over the Austrians at Jemappes (November 6) In December the King was brought to trial and called upon to answer for alleged acts of treason against the nation Sentence of death was passed upon him, and on Jan 21, 1793, he was beheaded The division of parties, which had been noticeable to some extent in the Legislative Assembly, became marked in the Convention The Girondists in the beginning possessed a decided majority, but as the party of moderation they showed themselves less able to cope with the many dangers that beset revolutionary France than the thoroughgoing members of the Mountain As the representatives, too, of the higher bourgeoisie, they were destined to fall before the fierce champions of democracy The downfall of the Girondist influence began with the trial of Louis XVI, when, against their will, they were compelled to vote to sentence the King to death.

On the frontiers the year 1793 opened with a series of disasters, which emphasized the folly of the declaration on February 1 of war against Great Britain, the Protestant Netherlands, and Spain Successive defeats were reflected at Paris in successive measures of a vigorous and revolutionary character Early in March 82 members of the Convention were dispatched to the different departments to raise 300,000 troops, and at Paris a Revolutionary Tribunal was established for the speedy trial of persons deemed guilty of crimes against the nation The defeat of Dumouriez (q v) at Neerwinden on March 18, and the desertion of that general to the Austrians, were followed in April by the establishment of an executive committee of the Convention, the first Committee of Public Safety, which under the leadership of Danton wielded dictatorial powers of government Civil war was already developing in France because of the resistance of the Catholic and royalist peasants of the Vendée and neighboring departments in western France to the levy of the 300,000 troops Up to this time, April, 1793, the Girondists had shared responsibility for every measure of a revolutionary character and had themselves created the instruments of their own overthrow and destruction But ever since the early weeks of the Convention the Girondists and the Mountain had been engaged in a life and death struggle, whose end was hastened by the terrible dangers which beset France Hostile armies had crossed the frontier and were pressing towards Paris Within was civil war In the words of Danton, audacious measures were necessary Danton and the Mountain were prepared to take them The Girondists wanted to debate when delay was treason The Girondists were overthrown on June 2, and their leaders expelled from the Convention and placed in custody The revolutionary commune of Paris, which contained the most radical individuals in power during the Reign of Terror, was placed on a legal footing In the meanwhile the deputies on mission were working with patriotic ardor in the provinces, and 13 armies were organized, equipped, and maintained in the field to serve against foes abroad and at home A democratic constitution, the constitution of 1793, was speedily drawn up and promulgated, but it never went into actual force The Committee of Public Safety ruled France from July, 1793, to July, 1794 In conjunction with the Committee of General Security in charge of the police administration, it saved France, though at the expense of the Reign of Terror

The Great Committee of Public Safety apportioned its work to the different members Carnot and Prieur of the Côte d'Or dealt with the questions of military strategy and the supply of arms and ordnance, Lindet and Prieur of the Marne had charge of the provisioning of the cities and the armies, Jeanbon Saint-André looked after the navy, Billaud-Varenne and Collot d'Herbois were charged with the internal administration and were the real managers of the Terror, Barère and Saint-Just were the spokesmen of the Committee in the Convention, while Robespierre, as the only member with a reputation, did little work, but was a figurehead who received all the glory and later all the blame for the acts of the Committee as a whole The services of Robespierre, though not very material, were none the less real, because, hiding behind his great personality, the workers were able, unquestioned and unhampered, to save France The Great Committee carried out the internal administration by sending out members of the Convention as deputies on mission to the different departments to control and direct the revolutionary authorities established in each locality Bluster, terror, imprisonment, and a few executions kept most of the departments in order War and measures of a harsher character were employed against the royalist and Catholic uprisings in the Vendée and Brittany, and against the Girondist insurgents in Caen, Lyons, Marseilles, Toulon, and Bordeaux Popular indignation against the Girondists became more bitter after the assassination of Marat (July 13) by Charlotte Corday, at the instigation, it was thought, of the Girondists at Caen By the end of 1793 the Girondist rising had all been suppressed and the leaders, including 21 deputies to the Convention, executed The Vendeans were completely defeated, but continued to carry on a guerrilla warfare until 1800 Nantes, the largest city in the Vendean country, was the headquarters of the infamous deputy on mission Carrier (q v), who executed more victims than did his colleagues in all the rest of France At Paris Fouquier-Tinville (q v) and the Revolutionary Tribunal sent about 2600 persons to the guillotine, including

nearly all of the notable victims of the Revolution from Queen Marie Antoinette down to the unsuccessful generals and the nonjuring priests It is worthy of notice that the number of victims during the Reign of Terror has been greatly overestimated, and that more Frenchmen perished in single battles under Napoleon The greatest sufferer during the Terror was the Catholic church, which had to expiate its abuses during the ancien régime and to suffer for its refusal to accept the civil constitution of the clergy The opposition to the church culminated in the spasmodic establishment of the Worship of Reason, marked by the Festival in Notre-Dame at Paris on Nov 10, 1793 Danton and Robespierre recoiled from such desecration, and the Worship of Reason gradually died out Later Robespierre tried to establish the Worship of the Supreme Being and inaugurated the new cult by the Festival of the Supreme Being on June 8, 1794 With the introduction of the Revolutionary Calendar in October, 1793, weeks were replaced by decades, and the observance of the Christian Sabbath and of saints' days instead of the *decadi* and the revolutionary festivals became a criminal offense These revolutionary festivals were celebrated in Paris with great pageants under the direction of the painter David The measures of the government of the Terror were not alone destructive and revolutionary, such as the Law of the Suspects and the Law of the Maximum, establishing fixed prices for commodities and wages, but included much of a constructive nature The bases of the civil and criminal codes were the work of the committees of the Convention Another committee devised the system of national education, afterward slightly modified and established by Napoleon The military committee under Dubois-Crancé effected the reorganization of the army The metric system and the French decimal currency were among the other creations of the Convention

The suppression of civil war and the establishment of internal order permitted the use of all the nation's resources against the foreign foe, and a succession of victories planned by Carnot and made possible by the labors of his colleagues soon began to reward the efforts of the Great Committee of Public Safety Beginning with the successes of Jourdan at Wattignies (Oct 16, 1793), and of Pichegru at Weissenburg in December, the invaders were driven out of France, and the French armies were able in the spring of 1794 to take the offensive The series of victories was crowned by Jourdan in the capture of Charleroi and the defeat of the Austrians at Fleurus (June 26, 1794) Thus, not only at home, but also against the foreign foe, the government of the Terror had justified itself

The Revolution, however, was destined, Saturn-like, to devour its offspring Robespierre and the Great Committee of Public Safety felt that the circumstances compelled them not only to crush insurrection and revolt, but also to silence any questioning of their policies and acts On the one hand, Hébert, Chaumette, and the other leaders of the Commune of Paris were more radical than the Great Committee and incurred the dislike of Robespierre, because of their devotion to the Worship of Reason, and because of the indecent character of the *Père Duchesne*, a series of political tracts published by Hébert On the other hand, the Great Committee and Robespierre feared Danton, who had begun to suggest that the Terror had gone far enough Robespierre and the Committee acted with promptness and vigor The Hebertists were executed on March 24, 1794, and the Dantonists on April 5 After the death of Danton, Robespierre seemed to be supreme, and at his bidding the Revolutionary Tribunal worked more speedily and sent daily to the guillotine almost as many victims as it had previously done in a week The Terror was at its height, but the fullness of time had come The victory at Fleurus rendered further terroristic measures unnecessary Furthermore, foes of Robespierre began to see that they stood in the way of the coming of his expected reign of peace and virtue and so were troubled for their own safety Among these were even members of the Great Committee, who conceived the idea of making Robespierre the scapegoat for their deeds The plot was laid, and on July 27 the blow fell Robespierre and his two friends in the Great Committee, Couthon and Saint-Just, and others of his followers were ordered under arrest and executed on July 28 and the following days This was the Revolution of the Ninth of Thermidor and the end of the Reign of Terror

The remaining 15 months of the Convention were a period of reaction The Committee of Public Safety, with a changing membership, continued to direct the administration, but the Revolutionary Tribunal was dissolved, the Law of the Maximum was repealed, the deputies ceased to go on mission, and the Jacobin Club, which had been so closely identified with the Terror, was closed Girondists and Conservatives who had withdrawn from the Convention or had been expelled were recalled Until the close of 1794 the Convention and the Committee of Public Safety were controlled by the Thermidorians, the men who had overthrown Robespierre During the winter of 1794–95 they were superseded by the returning Conservatives and Girondists, who devoted the last months of the Convention to an attempt to obtain revenge for their sufferings during the Terror On April 1, 1795 (12 Germinal), and on May 20 (1 Prairial), bread riots broke out in Paris, and the insurgents clamored for a restoration of the "red republicanism" of 1793 Both insurrections were crushed, the great Terrorists, like Billaud-Varenne and Collot d'Herbois, were deported, and the survivors of the Mountain imprisoned, deported, or executed This reaction, known as the White Terror, extended to the provinces, especially to southern France, where the vengeance wreaked upon the Mountain was more bloody than the Terror itself In the summer of 1795 the Convention performed the task for which it had been elected in the summer of 1792 and drew up a new constitution called the Constitution of the Year III The closing months of the Convention were marked by an unbroken series of military successes and by the first efforts towards the restoration of peace The United Provinces were occupied by Pichegru and organized as the Batavian Republic under French protection, and the French Minister in Switzerland signed at Basel treaties of peace with Tuscany, Prussia (April 5, 1795), Saxony, Hanover, Hesse-Cassel, and Spain (July) France remained at war with Sardinia, England, Austria, and the Empire

The Convention was not to close without one more insurrection in Paris—that of the 13th Vendémiaire (Oct 5, 1795), in opposition to the new constitution This rising was quelled by

Barras with the aid of Napoleon Bonaparte The Convention came to an end on Oct 26, 1795, and was replaced by the Directory, the government established by the Constitution of the Year III The executive authority was vested in a committee of five directors, and the legislative power was exercised by two houses, the Council of the Ancients and the Council of Five Hundred By order of the Convention the first directors and two-thirds of the first legislature were to be chosen from the members of the Convention One member of the Directory and one-third of the legislature were to retire annually, beginning in May, 1797 The new constitution had one fatal fault, it made inevitable a deadlock between the executive and the legislature and provided no means of breaking it except by revolution Such a deadlock occurred after the elections of 1797 and was met by three of the directors, Barras, Larévellière-Lépeaux, and Reubell, who, by the coup d'état of 18 Fructidor (September 4), expelled their colleagues, Carnot and Barthélemy, and a large number of the members of the two councils, thus preventing the triumph of the party of reaction which had won in the elections The reverse happened in the coup d'etat of 30 Prairial (June 18, 1799), when the councils asserted themselves and seized control of the executive, under the leadership of Sieyès The directors were assisted in the conduct of the central government by a ministry, which at one time or another included such able men as Talleyrand, Fouché, and Merlin of Douai The local administration was conducted in an arbitrary manner by national agents appointed by the central government The government was corrupt, and the reckless management of the finances would have ruined the nation had its coffers not been enriched by the plunder of Italy, sent home by Bonaparte The measures against the émigrés and the nonjuring priests lost little of their harshness Though the Worship of Reason had been forgotten, the attempt to give France civil religion continued, and new religions, like "Theophilanthropy," were devised and became the fad of the moment Society, under the influence of the brilliant and dissolute Barras, the most important of the directors, was corrupt, irreligious, and dissolute In short, little of importance and nothing of credit marked the internal history of the Directory, and only by the success of its military policy did it justify its existence In Italy Bonaparte crushed Sardinia and forced her to accept peace, and in a series of campaigns of unsurpassed brilliancy drove the Austrians out of Italy, marched on Vienna, and forced the Emperor, Francis II, to sue for peace, which was concluded at Campo Formio, Oct 17, 1797 In southern Germany Hoche and Moreau had conducted equally glorious but less successful campaigns against the Austrians Bonaparte refused to invade England, the one remaining enemy of France, and was encouraged by the directors, who feared him in carrying out his scheme of conquering Egypt as a step towards destroying England's power in India In spite of his victories the campaign was a failure The English fleet under Nelson destroyed the French fleet in the battle of the Nile (Aug 1–2, 1798) and held control of the Mediterranean Meanwhile, freed from the fear of Bonaparte, the enemies of France once more assumed the offensive Austria broke the Treaty of Campo Formio and, in alliance with England and Russia, renewed the war The combined Austrian and Russian armies, by the victories of Suvaroff at the Trebbia (June 17–19, 1799) and at Novi (Aug 15, 1799), drove the French into Genoa The reverses of the French arms and the evil internal conditions caused discerning men like Sieyès, Fouché, and Talleyrand to turn to Bonaparte as the possible savior of France In response to their invitations he returned from Egypt, and by the coup d'état of 18 Brumaire (Nov 9, 1799) overthrew the Directory and the councils and established a provisional government, consisting of himself, Sieyès, and Roger Ducos as consuls A new constitution, the Constitution of the year VIII, was drawn up, establishing the Consulate, with Bonaparte as First Consul, Cambacérès, Second Consul, and Lebrun, Third Consul A Tribunate was to debate proposed laws, which were to be voted upon without debate by the Corps Législatif Practically the First Consul was dictator, with absolute powers

Primary Authorities The files of newspapers, such as the *Moniteur* and Mallet du Paris, *Mercure de France*, the memoirs of contemporaries, such as those collected by Berville, Barrière, and Lescure, volumes in the *Collection des documents inédits sur l'histoire de France*, such as Aulard, *Recueil des actes du comité de salut public*, Brette, *Recueil des actes relatifs à la convocation des États généraux de 1789*, and Guillaume, *Procès-verbaux du comité d'instruction publique*, the volumes of the *Collection des documents relatifs à l'histoire de Paris pendant la Révolution française*, such as Aulard, *La société des Jacobins*, the publications of the *Société d'histoire de la Révolution française*, and the *Société d'histoire contemporaine*, the legislative proceedings as given in Buchez and Roux, *Histoire parlementaire*, and Mavidal and Laurent, *Archives parlementaires*, and numerous other publications, such as Kaulek, *Papiers de Barthélemy*, may be mentioned as the most accessible and useful Special bibliographies on the French Revolution are Tourneux, *Bibliographie de l'histoire de Paris pendant la Révolution française*, and a portion of the *Catalogue de l'histoire de France à la Bibliotheque nationale* The best short accounts are Mignet, *Histoire de la Révolution française* (1st ed, Paris, 1824, last ed, ib, 1861), Rose, *Revolutionary and Napoleonic Era* (New York, 1897); Morse-Stephens, *Europe, 1789–1815* (ib, 1893) The best product of modern scholarship is Aulard, *Histoire politique de la Révolution française, 1789–1804* (Paris, 1901) Leading works in English are Morse-Stephens, *History of the French Revolution* (2 vols, New York, 1886–91), and *The French Revolution* (vol viii of the "Cambridge Modern History," 1904). Of the more famous works, Carlyle, *French Revolution* (1st ed, London, 1837, last ed, ib, 1910), is a literary appreciation, Thiers, *Histoire de la Révolution française* (1st ed., Paris, 1823–27), is now useful only for the Directory, Quinet, *La Révolution* (1st ed, ib, 1885), and Taine, *La Révolution* (1st ed, ib, 1878–85), are philosophical and psychological rather than historical studies, Michelet, *Histoire de la Révolution française* (1st ed., ib, 1847–53), is the most brilliant literary history in French Though differing widely in method, bias, and value, the most useful special works are, for international relations Sybel, *Geschichte der Revolutionszeit von 1789 bis 1800* (5 vols, Dusseldorf, 1853–74; Eng trans to 1795, London, 1867–69), Bour-

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FRENCH RIVER A stream in Ontario, Canada, emptying Lake Nipissing into the Georgian Bay of Lake Huron, after a course of 55 miles (Map. Ontario, D 2) It is noted for its magnificent scenery, and for 150 years was the regular route to the Upper Lakes

FRENCH RYE GRASS See ARRHENATHERUM

FRENCH SETTLEMENTS. See FRENCH ESTABLISHMENTS IN INDIA

FRENCH SHORE See NEWFOUNDLAND

FRENCH SOMALILAND. See SOMALILAND

FRENCH SPOLIATION CLAIMS Demands made upon the United States government by American merchants for losses of ships and cargoes between 1793 and 1800 at the hands of the French, whose chief excuse for the depredations was that the United States had violated its pledges under the Treaty of 1778 By the Treaty of Sept 30, 1800, and by the Convention of April 30, 1803, France released the United States from certain treaty obligations, and in return was released from paying the merchants' claims, the United States securing peace at the expense of her citizens Between 1800 and 1885 some 50 bills to reimburse the claimants or their descendants came before Congress, and appropriations were twice voted, but were vetoed in each case by Presidents Polk and Pierce respectively No redress was obtained until 1885, when the adjudication of the claims was given to the Court of Claims, and decisions were reached awarding some $4,800,000 to the petitioners

FRENCH SUDAN, sōō'dan' A name formerly used to designate the territory forming a French dependency in western Africa extending from about 12° W long to Lake Chad, and from the Sahara on the north to the northern boundaries of the countries along the northern coast of the Gulf of Guinea (Map Africa, D and E 3) By the Decree of Oct 17, 1899, French Sudan ceased to exist, being in part allotted to Senegal, French Guinea, the Ivory Coast, and Dahomey, while the remainder was erected into two military territories and the Civil Territory of Upper Senegal and Middle Niger The Decree of Oct 1, 1902, attached Upper Senegal and Middle Niger to the protectorate dependent upon Senegal, under the name of the Territories of Senegambia-Niger The Decree of Oct 18, 1904, established the Colony of Upper Senegal and Niger, comprehending a civil territory and the Military Territory of the Niger All of the possessions above mentioned are within the Government General of French West Africa (q v.) The Military Territory of the Niger was detached from Upper Senegal and Niger and constituted an autonomous administrative subdivision of the Government General of French West Africa by Decree of Sept 7, 1911 (effective Jan 1, 1912) Consult. A L Gatelet, *Histoire de la conquête du Soudan français, 1878–99* (Paris, 1901), H Sarrazin, *Les races humaines du Soudan français* (Chambéry, 1901), C Favard, *France africaine, Sahara et Soudan* (Paris, 1905) See MILITARY TERRITORIES OF FRENCH SUDAN

FRENCH'TOWN A township in Monroe Co, Mich, on the river Raisin, about 22 miles southwest of Detroit, formerly the name of a village on the site of the present Monroe Here on Jan 18, 1813, during the second war between the United States and Great Britain, an American force of about 650, under Colonel Lewis, defeated a force of about 100 British, under Major Reynolds, and of about 400 Indians, under Round-Head and Walk-in-the-Water, the American loss being 12 killed and 55 wounded, and the British and Indian loss, though not definitely known, probably being considerably larger On the 20th Colonel Lewis was joined

by General Winchester with about 250 men, and on the 22d the combined force was defeated by a force of about 500 British, under Colonel Proctor, and about 600 Indians, under Round-Head and Walk-in-the-Water In accordance with the orders of General Winchester, who had been captured by the Indians, Major Madison surrendered his troops as prisoners of war, on condition that protection be afforded by Proctor against the Indians The prisoners who were able to march were taken by Proctor to Malden, Canada, and the wounded were left in the charge of an insufficient guard commanded by Major Reynolds at Frenchtown On the 23d the wounded were massacred by the Indians, in what is known as the Massacre of the River Raisin Of the total American force 397 were killed or were missing, 537 were captured, and only 33 escaped The British lost about 24 killed and 158 wounded, while the Indian loss, though doubtless very large, was never accurately determined Throughout the rest of the war "Remember the River Raisin" was used as a battle cry by the frontiersmen Consult Dawson, *Battles of the United States* (New York, 1858), Cullum, *Campaigns of the War of 1812* (ib, 1879), Johnson, *History of the War of 1812* (ib, 1882).

FRENCH VERSION See BIBLE

FRENCH WEST AFRICA A French government-general created by Decree of June 16, 1895, to embrace Senegal, French Sudan, French Guinea, and the Ivory Coast (Map Africa, C D E 3) The Decree of Oct 17, 1899, dissolved and reallotted French Sudan (q v) and added Dahomey to the government-general Up to 1902 the seat of government was at Saint-Louis in Senegal, and the Governor of Senegal was also the Governor-General, in that year, by Decree of October 1, Senegal was placed under a lieutenant governor (at Saint-Louis) and the seat of the government-general was transferred to Dakar (Senegal) This decree also attached Upper Senegal and Middle Niger to the protectorates dependent upon Senegal, under the name of the territories of Senegambia-Niger, to be administered by the Governor-General The Decree of Oct 18, 1904, which established the Colony of Upper Senegal and Niger, defined French West Africa as follows (1) the Colony of Senegal (which embraces the territories of direct administration forming the actual circumscription of Senegal, and the protectorates on the left bank of the Senegal River, which cease to be a part of Senegambia-Niger), (2) the Colony of French Guinea, (3) the Colony of the Ivory Coast, (4) the Colony of Dahomey, (5) the Colony of Upper Senegal and Niger, (6) the Civil Territory of Mauritania The estimated area and population (1911) are reported as follows

	AREA		Population
	Sq km	Sq m	
Senegal	191,600	73,977	1,247,096
Upper Senegal and Niger	782,700	302,200	6,035,090
Military Territory of the Niger	1,383,700	534,347	
Mauritania	893,700	345,058	250,000
French Guinea	239,000	92,278	1,927,000
Ivory Coast	325,200	125,560	1,265,000
Dahomey	107,000	41,313	902,000
French West Africa	3,922,900	1,514,632	11,626,000

By a Decree of Sept 7, 1911 (effective Jan 1, 1912), the Military Territory of the Niger ceased to be a part of the Colony of Upper Senegal and Niger and was formed into an administrative subdivision of French West Africa

The figures in the foregoing table must not be regarded as having the accuracy of a survey or a census They are careful estimates, but in the nature of the case cannot be exact In 1911 and 1912 respectively the general commerce of French West Africa showed imports valued at 150,817,649 and 134,781,982 francs, of which 67,573,618 and 55,336,990 from France and 2,273,595 and 2,516,518 from French colonies, and exports valued at 117,125,103 and 118,567,231 francs, of which 58,552,060 and 57,614,182 to France and 76,213 and 95,281 to French colonies In 1911 there entered at the ports 2431 vessels, of 4,172,000 tons Railway in operation (1913), 2400 kilometers, telegraph line, upwards of 20,500 kilometers The several colonies of French West Africa are in wireless-telegraphy communication Post offices (1913), 231 The budget for 1911 balanced at 56,250 000 francs The public debt (Jan 1, 1912) was 156,277,000 francs See the articles on the colonies included in French West Africa, and consult Henry Chevans, *La mise en valeur de l'Afrique occidentale française* (Dijon, 1907)

FREND, WILLIAM (1757–1841) An English reformer He was born at Canterbury and was educated at Saint-Omer, France, and, after a few weeks spent in business in Quebec, first at Christ's and then at Jesus College, Cambridge, where he studied for orders and took high honors In 1781 he was chosen fellow, and in 1783 was appointed rector at Madingley, near Cambridge In 1787 he became a Unitarian, issued an *Address to the Inhabitants of Cambridge to turn from the false Worship of Three Persons to the Worship of the one True God* (1788), and did his best to do away with obligatory subscription to the Thirty-nine Articles as a preliminary to the master's degree In 1788 he was removed from his office of tutor Five years later, after travels abroad, he wrote a radical pamphlet, *Peace and Union Recommended to the Associated Bodies of Republicans and Anti-Republicans,* for which he was tried and found guilty of breaking the Statute *De Concionibus* At this time he seems to have been popular among the undergraduates and to have made a disciple of S T Coleridge. He was banished from the university, but continued to hold his fellowship until he was married (1808). In 1806 he went to London and was connected with the Rock Life Assurance Company until 1826 His daughter Sophia married the mathematician Augustus De Morgan and was the mother of the novelist William Frend De Morgan William Frend was an able mathematician, an excellent Hebraist, and prominent in all radical movements of his time He wrote *Principles of Algebra* (1796–99) and published an annual called *Evening Amusements, or the Beauty of the Heavens Displayed* (1804–22) His pamphlets, besides those mentioned above, were *Thoughts on Religious Tests* (1789), *An Account of the Proceedings in the University of Cambridge against William Frend* (1793), *Scarcity of Bread* (1795), *A Letter to the Vice-Chancellor of Cambridge* (1798); *Principles of Taxation* (1799), *The Effect of Paper Money on the Price of Provisions* (1801), *A Letter on the Slave Trade* (1817).

FRENEAU, fre-nō′, PHILIP (1752–1832) An American poet, born of Huguenot parentage in New York, Jan 2, 1752 When he was a year old his family moved to New Jersey, near what is now Freehold He was educated by his mother till he was 10 years old, and then was tutored in Latin and Greek by a clergyman He graduated (1771) from Princeton, where he was a college mate of James Madison, with whom he roomed, and of H H Brackenridge (q v) He wrote with the latter for the college commencement a poem on "The Rising Glory of America" He had begun writing verses early, and did much ephemeral work immediately after graduating After teaching school for a time he studied law and made his first essay in journalism in Philadelphia In 1776 he made a voyage to the Danish West Indies, serving as mate and acquiring nautical experience On his return to the United States he did some editing with Brackenridge, then took out letters of marque and made a voyage in a privateer, the *Aurora*, which he had built (1780) In May he was captured by the English, and recorded his experiences on a prison ship at New York in a prose narrative and in a strong poem in four cantos, "The British Prison Ship" He regained his liberty in July, 1780, wrote much in prose and satiric verse in periodicals, collected his poems (1786), and occupied himself as shipmaster and journalist till Aug 16, 1791, when Jefferson made him translator for the State Department and induced him to take charge of the violently Anti-Federalist *National Gazette* Two years later, on Oct 1, 1793, Freneau retired to his home at Mount Pleasant, N J , and edited the *Jersey Chronicle* for a year Then he tried journalism in New York, but soon abandoned it for the sea He made several voyages, one as far as Calcutta, but retired in 1809 in consequence of the laws restricting navigation In 1789 he had married Miss Eleanor Forman An enthusiastic walker, he insisted on returning on foot from the house of a friend, where he had been spending the evening, Dec 18, 1832 He was overtaken by a severe snowstorm, lost his way, and was found dead the next day Editions of Freneau's poems (which are hard to obtain) were published during his life in 1786, 1788 (containing some prose), 1795, 1809, and 1815 The last was filled with panegyrics on the soldiers and sailors of the War of 1812 The edition of 1786 was reprinted in London and New York, 1861 and 1865 Freneau was the first genuine American poet of marked ability His best poems are lyrics, such as "The Indian Burying-Ground," "The Wild Honeysuckle," and "Eutaw Springs" He published a few volumes of mediocre prose under the pen name of "Robert Slender" Consult The biography by Mary Austin (New York, 1901), Tyler, *Literary History of the American Revolution* (ib., 1897), Wendell, *Literary History of America* (ib, 1900), E F De Lancey, *Philip Freneau, the Huguenot Patriot Poet of the Revolution* (ib, 1891), S E Forman, *The Political Activities of Philip Freneau* (Baltimore, 1902), P. E. More. *Shelburne Essays* (5th series, New York, 1908), Paltsits, *Bibliography of the Works of Freneau* (ib, 1903) A complete edition of Freneau's poems was prepared by F L Pattee (3 vols, Princeton, 1902–07)

FRENSSEN, frĕn′sen, GUSTAV (1863–) A German novelist and clergyman, born at Barlt in Holstein. He studied theology at Tübingen, Kiel, and Berlin and lived as pastor at Hemme from 1890 to 1902, when he moved to Meldorf Later, at Blankenese, he devoted himself exclusively to literature His first novel, *Die Sandgrafin* (1896), showed little originality, his second, *Die drei Getreuen* (1898), showed progress, in *Jorn Uhl* (1901), a strong novel of peasant life, he struck his pace and became famous An English translation appeared in New York in 1905 His fourth, *Hillegenlei* (The Land of Happiness) (1905), less successful, shows traces of the purpose novel His next, *Peter Moors Fahrt nach Sudwest* (1906), with its interesting pictures of life in German Africa, is better done *Klaus Hinrich Baas* (1909) is a realistic novel of money worship, while *Der Untergang der Anna Hollmann* (1911) is a pessimistic sea tale of sustained interest with some of the characteristics of the fate tragedy It is not the equal of *Jorn Uhl* He wrote also the drama *Sonke Erichsen* (1912) Consult Lowenberg, *Frenssen, von der Sandgrafin bis zum Jorn Uhl* (1903)

FRENTA′NI. A people in central Italy, on the east coast, in the early ages, descended from the Samnites They dwelt in a hilly region on the shores of the Adriatic Sea, and their chief town was Histonium (see VASTO) Consult Conway, *Italic Dialects* (2 vols, Cambridge, 1897)

FRENZEL, frĕnts′el, KARL WILHELM (1827–1913) A German journalist and novelist, born and educated in Berlin In 1861 he became dramatic and literary critic of the *National-Zeitung* of Berlin His works include many historical novels depicting eighteenth-century French life and later German life, e g, *Frau Venus* (2 vols, 1880), *Schonheit* (1887), and *Wahrheit* (1889) Several of these are well known, such as *Charlotte Corday* (1864), *Watteau* (1864), *La Pucelle* (1871), *Lucifer, ein Roman aus der Napoleonischen Zeit* (1873) His *Berliner Dramaturgie* (reprinted 1882) is a valuable contribution to the history of the modern German drama.

FREPPEL, fre-pĕl′, CHARLES EMILE (1827–91) A French prelate and historian He was born at Obernai, Lower Alsace, studied at Strassburg, and, after being ordained a priest, taught there In 1870 he became Bishop of Angers He was a champion of the doctrine of the infallibility of the Pope, and defended it before the Ecumenical Council at the Vatican After the Franco-German War he publicly counseled the restoration of the monarchy, and on numerous occasions, more particularly during the controversy between Bismarck and the Vatican, he revealed his anti-German tendencies The Catholic University at Angers was founded by him in 1875 He was, after 1881, a leader of the Clericals in the French Chamber of Deputies His 30-odd volumes on Church history and kindred subjects include *Les pères apostoliques et leur époque* (3d ed, 1870), *Les apologistes chrétiens au IIe siècle* (3d ed, 1887), *Examen critique de la vie de Jésus-Christ par M. Renan* (15th ed, 1866), a violent polemic, *St Irenée* (1861), *Tertullien* (1863), *Origène* (1867) His complete works were published in 10 volumes (1880–88) Consult the biographies by Cornut (Paris, 1893) and Charpentier (Angers, 1904)

FRÈRE. frâr A family of French painters CHARLES THÉODORE (1815–88), the eldest, genre and landscape painter, was born in Paris He was a pupil of Cogniet and Roquelan, and made

his first exhibit in 1834 Two years later he went to Algeria, traversed the desert, visited the East, and was present at the fall of Constantine, in October, 1837 In 1869 he accompanied the Empress Eugénie in her voyage up the Nile, making a sketchbook of aquarelles at her request His favorite subjects for pictures were scenes from Eastern life, but he occasionally produced military pieces Although much prized in their day, his pictures are distinctly inferior to the best Orientalist art Among the best of them are a series of scenes in Constantine (1840–48), a "Bazaar in Damascus," a "Harem in Cairo," "Festival in Constantinople," "Ruins of Karnak," "Caravan of Mecca" The Metropolitan Museum, New York, possesses "Cairo, Evening," "View of Jerusalem," "Departure from Jerusalem for Jaffa" He received medals in 1848 and in 1865 He died in Paris, March 25, 1888 —2 PIERRE EDOUARD (1819–86) A genre painter, brother of the preceding He was born in Paris, Jan 10, 1819, and studied under Paul Delaroche and in the Ecole des Beaux-Arts He exhibited his first picture in the Salon of 1843 At the close of the Exposition of 1855 he was decorated with the cross of the Legion of Honor He was one of the most sane and wholesome of French genre painters, and his portrayal of humble household scenes and child life are marked by true sentiment He possessed also a fine sense of color His pictures are well known through reproductions Among the best are the "Little Gourmand," "Curiosity," "Repose," "The Little Cook," "First Steps," "The Library," "Going to School" There are six of his pictures in the Walters Gallery, Baltimore, and one in the Metropolitan Museum, New York Frère died at Anvers-sur-Oise, May, 1886 — CHARLES EDOUARD (1837–94) A genre, landscape, and portrait painter, son and pupil of Théodore He also studied under Couture He received a first-class medal in 1865 Among his paintings are the "Muleteer in the Alps" (1865), "The Basket-Sellers," "Before the Rain" (1875), "The Surgical Operation" (1884)

FRERE, frēr, SIR HENRY BARTLE EDWARD, familiarly known as SIR BARTLE FRERE (1815–84) A British diplomat and administrator He was born at Clydach, Brecknockshire, March 29, 1815, and after education at Bath Grammar School went to Haileybury College to prepare for the Indian Civil Service, which he entered in 1834, and in 1835 he was appointed assistant revenue commissioner at Poona His judicious treatment of native agriculturists led to beneficial results and to his advancement In 1842 he became secretary to Sir George Arthur, Governor of Bombay, in 1846 proceeded to Sindh as British Resident, and in 1850 was appointed Chief Commissioner In 1859 he was created K C B in recognition of valuable services during the Indian Mutiny, for which he twice received the thanks of Parliament From 1862–67 he was Governor of Bombay On his return to England he was created G C S I and nominated member of the Indian Council in London In 1872 he went as special commissioner to East Africa and induced the Sultan of Zanzibar to sign a treaty abolishing the slave trade In 1875 he was chosen to accompany the Prince of Wales to Egypt and India He was Governor of Cape Colony 1877–80, and as High Commissioner for British South Africa was deputed to arrange the confederation of the South African colonies, which was frustrated by the Kaffir and Zulu wars and trouble with the Boers He was recalled and lived in retirement at Wimbledon until his death, March 29, 1884 He was several times president of the Royal Asiatic Society, and in 1872–73 was president of the Royal Geographical Society His writings, consisting of letters, speeches, etc, include a *Memoir of the Right Hon John Hookham Frere*, prefixed to the latter's works (1871–74), *Pandurang Hari, or Memoir of a Hindoo, Eastern Africa as a Field for Christian Labor* (1874) Consult Martineau, *Life and Correspondence of Sir Bartle Frere* (London, 1895)

FRERE, JOHN HOOKHAM (1769–1846) An English diplomat and author He was born in London, and in 1785 went from a Putney preparatory school to Eton He proceeded to Caius College, Cambridge, graduated B A, 1792, M A in 1795, and was elected a fellow He entered the Foreign Office under Lord Grenville, and from 1796 to 1802 represented West Looe, Cornwall, in Parliament As a contributor to the *Anti-Jacobin* he supported Canning's defense of Pitt's administration, and in 1799 was made Undersecretary of State He was appointed Envoy to Lisbon in 1800, and twice went as Minister to Spain in 1802 and 1808 His counsel, resulting in Sir John Moore's disastrous retreat to Corunna, caused his recall He afterward refused an ambassadorship at St Petersburg, and he twice declined the offer of a peerage Owing to his wife's ill health, he retired to Malta and devoted himself to literature and languages His mock-heroic poem, *Prospectus and Specimen of an Intended National Work by William and Robert Whistlecraft, of Stow-Market in Suffolk, Harness and Collar Makers, intended to comprise the most interesting particulars relating to King Arthur and his Round Table* (1817), furnished the model for Byron's *Beppo* and *Don Juan* Frere's fame rests on his translations of Aristophanes, *The Acharnians, The Knights, The Birds*, and *The Frogs*, which were privately printed, and only made public in 1847 by Sir G. Cornewall Lewis in *The Classical Museum* Consult *Memoir and Works of the Right Hon John Hookham Frere*, by W E and Sir Bartle Frere (London, 1874), and Festing, *J H Frere and his Friends* (ib, 1899)

FRÈRE-ORBAN, frâr′ ôr′baN′, HUBERT JOSEPH WALTHER (1812–96) A Belgian statesman He was born at Liége, received his education at home and in Paris, and began the practice of law in his native town He identified himself with the Liberal party, and was conspicuous in the controversy with the Catholic clergy In 1847 he was elected to the Belgian Chamber and appointed Minister of Public Works, and from 1848 till 1852 he held the portfolio of Finance He founded the national bank of Belgium, reduced postage, and was a strong advocate of free trade His work, *La mainmorte et la charité* (1854–57), directed against the Conservatives, produced a great effect on the position of parties in Belgium As a result, in 1857 the Liberals returned to power and Frère-Orban became once more Minister of Finance in the cabinet of Rogier, whom he succeeded as Prime Minister in 1868 In 1870 the Catholics regained their supremacy and forced him to retire, but from 1878 to 1884 he was again at the head of the cabinet Subsequently he led the Opposition in Parliament till 1894, when he lost his seat, over the suffrage extension question He was a successful financier

and a believer in the doctrine of free trade His liberalism consisted in the assertion of the authority of the state over the church and the defense of the system of secular public instruction against the clergy He was at all times opposed to the undue extension of the suffrage Among other works he wrote *Le question monétaire* (1874)

FRERICHS, frā'rĭks, FRIEDRICH THEODOR VON (1819–85) A German physician, born at Aurich and educated at Gottingen and Berlin After holding a professorship at Kiel and conducting the clinical institute and hospital in that city, he was for eight years professor of pathology and therapy at Breslau (1851–59), whence he was called to Berlin in 1859, where he became permanently established He was considered one of the leading medical authorities in the German capital, and as physician on the general medical staff of the Prussian army rendered particularly valuable services during the Franco-German War His principal work is the *Klinik der Leberkrankheiten* (2d ed, 1861, Eng trans, 1860, under the title *A Clinical Treatise on the Diseases of the Liver*, also translated into French and Italian)

FRÉRON, frā'rŏN', ELIE CATHERINE (1719–76) A French critic and controversialist A brilliant pupil of the Jesuits, he was made professor at the Collège Louis-le-Grand at the age of 20, and on leaving the Jesuits (1739) was engaged for 35 years as contributor to literary journals, in which he carried on a relentless war with Voltaire in particular and against the encyclopædic movement in general, on account of its antireligious doctrines His work is not without cleverness and good literary judgment, but is best remembered for the retorts it evoked from Voltaire, notably *Le pauvre diable*, *L'Ecossaise* and *L'Ane littéraire* (The Literary Donkey), the title of which parodied that of Fréron's journal *L'Année Littéraire* (1754–76) and reminds one of Pope's famous *Dunciad* Fréron wrote also histories of *Mary Stuart* (1742) and of *Germany* (1771), as well as negligible verses He died in Paris, March 10, 1776 Consult Nisard, *Les ennemis de Voltaire* (Paris, 1853), Monselet, *Fréron* (ib, 1864); J Trévedy, *Notes sur Fréron et ses cousins Royon* (ib, 1902)

FRÉRON, LOUIS MARIE STANISLAS (1754–1802) A French journalist and legislator, son of the preceding, born in Paris He was educated at the Collège Louis-le-Grand and was a schoolmate of Robespierre He first came prominently before the public as editor of the *Année Littéraire* In 1790 he founded the revolutionary journal *L'Orateur du Peuple* He was elected a deputy to the Convention in 1792, was a follower of Danton, and after persecuting the Royalists with great cruelty, contributed to the downfall of Robespierre and attacked the Terrorists, finally entering into negotiations with the Monarchist faction He was an unsuccessful suitor of Pauline Bonaparte, and in 1799 was made subprefect of Haiti, where he died soon afterward from the effects of the climate His *Mémoire historique sur la reaction royale et sur les massacres du Midi* (1796) defends his conduct at Toulon in 1793, as commissioner of the army of Italy Consult Arnaud, *Le fils de Fréron* (Paris, 1909).

FRES'CO (It, cool, fresh), or **FRESCO PAINTING** The term properly applied to the process as well as to the painting executed upon plaster while it is still wet or fresh hence the Italian name *al fresco* It is also improperly used for painting executed directly on the surface of a wall, such as *tempera* (q v), also called *distempera*, which is the process in which water colors mixed with egg or some glutinous substance are used The method of true fresco painting is as follows A wall, either of brick or stone (better than laths) and perfectly dry, is plastered with lime and water (hydrate of lime), which has been prepared and allowed to stand for at least a year Before using it is mixed with sand, and while the water is in process of being expelled by the carbonic acid in the lime, the pigments must be applied in order that the protective covering of carbonate of lime may form over them The first and coarser coats, called *arriccio*, may be applied over the entire wall about half an inch thick and with a roughened surface, the two finer finishing coats, called *intonaco*, are applied only on whatever portion of the surface can be painted in a day This surface is then covered by the corresponding portion of the artist's cartoon, of the same size as the finished fresco is to be This cartoon is executed usually in black and white and quite sketchily, though the artist often has for further assistance a smaller sized colored sketch for use in the details and color scheme The impression of the cartoon is left on the plaster either by pouncing or by indenting the outlines with a pointed implement of wood or bone, and the cartoon being then removed, the painter proceeds to apply the colors, these are mostly earths or minerals, as few others will stand the action of lime, and they are ground and applied with pure water The coloring is necessarily thin, transparent, and light, though since the late Renaissance the more liberal use of *impasto* has lessened these qualities, giving greater opacity When the day's work is finished the artist cuts away any of the plaster that he has not painted on, beveling it at the very edge of his finished work, and the next day the plasterer joins closely another portion of plaster to the edge of the portion painted on the previous day The lime, in drying, throws out a kind of crystal surface, which protects the color and imparts a degree of clearness much superior to, and easily distinguishable from, that of a work in tempera or size paint This process, although apparently simple, nevertheless requires great dexterity and certainty of hand; for the surface of the plaster is delicate and must not be overworked, besides, the lime only imbibes a certain quantity of additional moisture in the form of liquid colors, after which it loses its crystallizing quality and the surface, or a portion of it, becomes what painters call rotten Many frescoes are defective in this way It is only after the lime has dried that such flaws are discovered, the proper plan in such a case is to cut away the defective portion, have fresh plaster laid on, and do the work over again But the flaws are too often retouched with tempera or size colors, and though they may escape notice for a time, the parts touched will change or come off in the course of a few years All retouching must, of course, be done *a secco* on the dry plaster and must be sparingly used Another difficulty in fresco is that the colors become much lighter after the plaster dries, and for this allowance must be made However, by practice the painter

may soon get over this difficulty and he can test the difference between the color as wet and as dry by putting a touch on a piece of umber he has generally at hand which instantly dries the color and shows it as it will be when the lime has dried *Fresco secco* is a spurious kind of fresco, ordinarily used only in house decorations The colors are the same, but they are laid on after the plaster is dry Before the work begins the dry plaster is rubbed with pumice stone to remove the crust, and then washed with water mixed with a little lime The effect is coarse, dry, and common, and the thin protecting crust is inadequate to preserve the painting

The preeminence claimed for fresco painting is founded on (1) clearness and purity of color, (2) a dead surface as far removed from the dullness of tempera as from the gloss of oils and so capable of being viewed from all points, (3) durability under all conditions, (4) cheapness of process, (5) necessity for quick work, precluding the frittering of artistic energy on unessentials On the other hand, it labors under the disadvantage of the fragility of the plaster, the lack of depth and richness, and the necessity of more or less retouching by another process (*a secco*)

History Fresco painting seems to have been known to the Egyptians, and it was certainly practiced by the Greeks and after them by the Romans, but the only surviving examples were found in Herculaneum and Pompeii It occurs also in the catacombs of Rome and Naples, but was neglected in the Middle Ages The peculiar construction of the Italian Gothic, with its flat wall surfaces, offered a splendid opportunity for fresco painting on a grand scale The church of St Francis of Assisi, which became a museum of fresco painting of the thirteenth and fourteenth centuries, led the way, and soon, particularly through the influence of Giotto, the greatest development of the art that the world has ever seen began in Italy In the fifteenth century it flourished especially in Florence in the works of Massaccio, Ghirlandaio, and others, whose achievements paved the way for its supreme achievement in Michelangelo's ceiling of the Sistine Chapel and Raphael's Stanze in the Vatican In northern Italy it flourished at Padua in the fifteenth century, at Milan, and especially at Parma in the cupola decorations of Correggio, perhaps the consummate master of the technique, but whose exaggerations of movement contributed to the extravagances of the baroque (seventeenth century) Fresco painting was very widely practiced in the eighteenth century, but degenerated into superficial decoration, and only charms by its gay lightness in the works of such masters as Tiepolo and certain French rococo painters In the early nineteenth century it was practically rediscovered by the German Nazarenes (see PRE-RAPHAELITES) at Rome, and an important development in Germany was made possible by the commissions of Louis I of Bavaria, who caused churches, palaces, and museums of Munich to be decorated in this medium, chiefly after the designs of Overbeck Its practice continued in Germany, and it was also introduced into England in the decorations of the Houses of Parliament, but its use has of late diminished, giving place to oil and encaustic painting (qq v.)

Bibliography. The process of fresco, as practiced by the early Italians, is described in the well-known work of the contemporary painter Cennino Cennini Its development is also treated in the paragraph *History* of the general article PAINTING Modern treatises on the subject are those of Taylor, *A Manual of Fresco and Encaustic Painting* (London, 1847), von Seidlitz, "Ueber Frescotechnik," in *Kunst fur alle*, vol xv (Munich, 1900), Ward, *Fresco Painting, its Art and Technique* (London, 1909)

FRESCOBALDI, frĕs'kō-bal'dē, GIROLAMO (1583–1644) A celebrated Italian organist and composer, born at Ferrara Very little of his earlier life and training is known, although he had published a collection of five-part madrigals as early as 1607 He appears to have studied with Luzzaschi in his native place, afterward taking up his residence in Belgium Returning to Italy, he lived first in Milan and later on in Rome, where some time about 1614 he obtained the position of organist at St Peter's By this time he had acquired wide fame as an organ virtuoso, as many as 30,000 people, it is recorded, having gone to hear his first performance at St Peter's With the exception of one short interval (1628–33), during which period he held the appointment of court organist at Florence, he retained his position at Rome He is regarded by many historians and musical authorities as the greatest organist of the first half of the seventeenth century, while as a composer he is scarcely less famous. In the latter capacity he is credited with anticipating the modern key system and the introduction of advanced ideas in fugal form and musical notation Frescobaldi's music is the highest type of early seventeenth-century music and displays the consummate art of the early Italian school His vocal compositions include canzones, motets, hymns, and the collection of madrigals already noted. Consult F X Haberl, *Frescobaldi* (Leipzig, 1887)

FRESENIUS, fre-zī'nē-ŭs, KARL REMIGIUS (1818–97) An eminent German analytical chemist. He studied at Bonn and at Giessen and was assistant to Liebig In 1845 he became professor of chemistry and allied sciences at the Agricultural Institute of Wiesbaden Fresenius carried out numerous important investigations in analytical chemistry and did much towards systematizing this art by the publication of excellent works His exhaustive standard treatises, well known to every student of chemistry, have passed through many editions in German and have been translated into several languages They include *Anleitung zur qualitativen chemischen Analyse*, first published in 1841, and *Anleitung zur quantitativen chemischen Analyse* (1845) In 1862 he founded the *Zeitschrift fur analytische Chemie* See ANALYSIS, CHEMICAL

FRESENIUS, REMIGIUS HEINRICH (1847–) A German chemist, born in Wiesbaden, son of the chemist, Karl Remigius Fresenius He studied at the universities of Berlin and Leipzig (under Kolbe), in 1872 became docent in the Wiesbaden chemical laboratory, in 1881 head of the agricultural experiment station there, and in 1897 director of the Fresenius Chemical Laboratory, and was editor of the *Zeitschrift fur analytische Chemie* (in 1882–97 with his father, after 1897 with his brother Wilhelm and E Hintz) He wrote valuable monographs on many European mineral springs.

FRESH-AIR WORK. A form of charity which consists in taking poor children from the slums of great cities into the country or to the

seashore for recreation The first authenticated case of charity of this kind was in 1849, when Rev William A Muhlenburg a pastor in New York City, sent poor and sick people from his parish into the country for short vacations In 1872 the New York *Times* inaugurated a system of free excursions, and its example was followed in other parts of the country The first general fresh-air societies were organized in 1874 Since that time the number of such societies has greatly increased In 1914 they numbered nearly 100 General agencies, church organizations, and private funds provide for between 2,500,000 and 3,000,000 days' outing for poor children of the cities The beneficiaries are for the most part children from 6 to 12 years old, though some of them are infants A few adult women usually accompany them They are sent away from the city for periods varying from a few hours to a fortnight spent in the so-called country "homes," or as the guests or boarders of private families As a rule, the parents of the children are not required to bear any of the cost In London, on the other hand, parents often pay as much as a third or more of the expense

On the continent of Europe, *Switzerland* was the first country to develop this form of charity The Rev W Bion, of Zurich, established the first of the vacation colonies in 1876 Provision had been made for poor children previously, but it was not until that year that the work was systematized and brought into close relation with the public schools The colonies are usually situated in the mountains Comfortable lodgings and wholesome food are furnished free of charge. Part of the expense is borne by the state and by municipal governments The organization of fresh-air charity in *Germany* was contemporaneous with its organization in Switzerland The first children's sanatoriums were organized in Kolberg and Rothenfelde in 1874 Two years later the first children were sent to vacation colonies The plan soon gained favor throughout Germany, most of the important cities make provision through public and private agencies for vacations in colonies for considerable numbers of the children of the poor In addition, large numbers of children are given excursions lasting a day Those who are sent to a distance, to seaside or health resorts, are usually accompanied by a teacher It is also common in Germany and Denmark for the artisan classes in the city and country to make a temporary exchange of children during a part of the summer In *France* fresh-air charities are less developed than in any other important European country, but they are gradually rising in importance Paris, Lyons, Bordeaux, Lille, Toulouse, Nancy, Besançon, and other cities have established colonies

Vacation colonies have also been established in Spain, Italy, Austria-Hungary, Belgium, Russia, and in Argentina The system in Europe is superior to the system in the United States in two respects—there is marked cooperation of fresh-air agencies in Europe by means of conferences and exchange of reports The most important recent development of fresh-air work is the founding of seaside and country homes for children suffering from surgical tuberculosis Experiments with open-air treatment for children of the cities suffering from nonpulmonary tuberculosis have been conducted in European countries for several decades, the first being at Calais, where a hospital was founded for this purpose in 1861 In America the first systematic experiment was conducted at Sea Breeze, near New York City, in 1904, and it was demonstrated that a few months in the sea air would cure children who otherwise would be hopelessly crippled Since that time an active propaganda for this form of fresh-air work has been carried on by the New York Association for Improving the Condition of the Poor, and elsewhere Consult Ufford, *Fresh Air Charity in the United States* (New York, 1897), Germain, "Vacation Colonies in Switzerland," in *Consular Reports*, vol lii, No 193, Comte, "Les colonies de vacances," in *Revue philanthropique* (Paris, 1898), Allen, "The Sea Air Treatment for New York's Bedridden Children," in *Review of Reviews*, vol xxxii (New York, 1905), Delperier, *Les colonies de vacances* (Paris, 1908)

FRESH'FIELD, DOUGLAS WILLIAM (1845–) An English geographer and mountaineer He was educated at Eton and at University College, Oxford, became a member of the Alpine Club in 1864 (president, 1893–95) and edited the *Alpine Journal* in 1872–80, and prominently identified himself with the Royal Geographical Society (president, 1914), the Geographical Section of the British Association (president, 1904), and the Association of Geographical Teachers He traveled and climbed mountains in many parts of the world, being the first to make ascents in the Caucasus (Elbruz and Kasbek, 1868, later, Gulba, Tetnuld, 1887, Laila 1889) In 1899 he visited the Sikkim Himalayas and in 1905 the base of Ruwenzori (Equatorial Africa) Much interested in historical problems relating to the Alps, especially as to the pass utilized by Hannibal, he published *Hannibal Once More* (1914) His other writings include *Travels in Central Caucasus and Bashan* (1869), *Italian Alps* (1875), *Exploration of the Caucasus* (1896, 2d ed, 1902), *Round Kangchenjunga* (1903)

FRESH-WATER MARSH HEN See RAIL

FRESH-WATER MUSSEL Any of the great many species of *Unio* or *Anodon*—bivalve or pelecypod mollusks of rivers and ponds, especially abundant in North America See MUSSEL

FRESNEL, frā'nĕl', AUGUSTIN JEAN (1788–1827) A French physicist He was born at Broglie and was educated at Caen at the Ecole Polytechnique and at the Ecole des Ponts et Chaussées On the completion of his studies he was sent as government engineer to the Department of Vendée, and afterward to the Department of Drôme, where he remained till 1814 He lost his position on the return of Napoleon from Elba, because he, as a Royalist, had offered his services to the Bourbons After the Second Restoration he returned to Paris, where he resumed his duties as government engineer In the interval he devoted his enforced leisure with great success to physicomathematical researches, investigating in particular the polarization of light In ignorance of the work of Thomas Young (q v), Fresnel demonstrated to his countrymen the error of the Newtonian theory of the propagation of light (q v) by the emission of material particles and so ably advocated the undulatory hypothesis that Arago, who was a member of a commission appointed to consider the paper containing the new theory, became an enthusiastic convert to his ideas Fres-

nel's crowning experiment, which demonstrated the truth of the theory, was with the two mirrors inclined at an angle of nearly 180°, so that the incident beams were reflected to the same point, and alternate light and dark bands or fringes were seen This was not caused by diffraction, as the beams were reflected from the surface of the mirrors Having convinced himself that light was due to wave motion, he further advanced the theory that these waves in the ether were *transverse*, i e, that the displacements in the ether were perpendicular to the direction of propagation of the waves No contribution to the theory of light is more important With Arago he investigated the action of polarized light, and their discoveries, published in a joint memoir, confirmed the new theory of the mode of the propagation of light His theory of the explanation of double refraction by biaxial crystals, involving a most complicated wave surface, has stood the test of modern work He elaborated a theory of reflection and refraction and deduced formulæ which observations have proved to be correct, even though his theory was defective Mention should also be made of his theory of the aberration of light and its resulting formulæ His practical application of scientific optics to the improvement of lighthouse illumination was of incalculable value, and he served for several years as a member of the lighthouse commission Consult Robert Moon, *Fresnel and his Followers* (Cambridge, Eng, 1849), and D F Arago *Biographies of Distinguished Scientific Men*, vol. ii (Boston, 1859) See LIGHTHOUSE

FRESNILLO, frās-nēl'yō. A town in the State of Zacatecas, Mexico, 36 miles by rail northwest of the city of Zacatecas, on the Mexican Central Railway (Map Mexico, H 6) It is situated at an elevation of nearly 6900 feet and is well built and laid out with broad, straight streets Stock raising is carried on in this region, but the town derives its chief importance from the rich silver and copper mines of the Cerro del Proaño, discovered in 1554. There are other mineral deposits Pop (est), 6500

FRES'NO, frĕz'nō A city and the county seat of Fresno Co, Cal, 209 miles southeast of San Francisco, on the Southern Pacific and the Atchison, Topeka, and Santa Fe railroads (Map California, F 6). It is situated in the centre of the San Joaquin valley and has many attractive buildings, among which are the Federal building, erected at a cost of $250,000, Carnegie library, city hall, and courthouse Places of interest in the vicinity are King's River Cañon, Roeding Park, and Kearney Park, an irrigated experimental farm owned by the University of California The city is the centre of an agricultural and stock-raising district, has important petroleum interests, and extensively exports raisins, wines and brandies, grapes, oranges, olives, and other fruits, shipping more than 12,000 carloads annually, besides wheat, sheep, and horses The chief industrial establishments are fruit-packing plants, a cooperage, icing plants, planing and flour mills, an oil refinery, macaroni factories, a brewery, wagon works, etc Under a charter of 1901 the government is vested in a mayor, elected every four years, a municipal council, and administrative officials, all of whom are appointed by the mayor with the consent of the council, excepting the city clerk, police judge, and school directors, chosen by popular vote. Settled in 1872, Fresno became the county seat in 1874 and was chartered as a city in 1885 Pop, 1900, 12,470, 1910, 24,892, 1914 (U S est), 28,809, 1920, 44,616

FRET (probably from OF *frete*, iron band, ferrule, syncopated from It, ML *ferrata*, iron grating, from *ferrare*, to bind with iron, from Lat *ferrum*, iron) A charge in heraldry (q v)

FRÉTEAU DE SAINT-JUST, frā'tō' de sĭn-zhust', EMMANUEL MARIE MICHEL PHILIPPE (1745–94) A French politician, born in Paris. In 1787 he was imprisoned in the castle of Doullens for his opposition to the King, but returned to his seat in Parliament a year later He was a deputy to the States-General and was one of the first of his rank to join the Third Estate He became a member of the Constitutional Committee, then Secretary and twice President of the Assembly In 1790 he introduced a resolution that only the Assembly, acting on the King's initiative, had the right to make war, demanded that the title of Archbishop should be done away with and voted for the suppression of all titles of nobility, and near the end of the year was elected judge in Paris In 1792 he resigned from the presidency of the First Arrondissement and retired to his home at Vaux-le-Pénil Two years afterward he was arrested on the charge of joining two priests in an antirevolutionary plot He was acquitted, but was kept in prison, and two months later was tried and executed for favoring the schemes of Capet and for complicity with Thouret and Le Chapelier

FRETUM GALLICUM See BONIFACIO

FRETUM HERCULEUM See GIBRALTAR

FRETUM MAMERTINUM See MESSINA, STRAIT OF

FRETUM SICILIÆ, frē'tŭm sĭ-sĭl'ĭ-ē, or **FRETUM SICILIEN'SE.** One of the ancient names of the strait between Italy and Sicily See MESSINA, STRAIT OF

FREUD, froit, SIGMUND (1856–) An Austrian physician and psychopathologist He was born in Freiburg, Moravia, May 6, 1856 After graduating in medicine from the University of Vienna, he was, in turn, demonstrator in the physiological institute, assistant physician in the general hospital, and lecturer on nervous diseases In 1885 he went to Paris, where for a year he was a pupil of Charcot In 1902 he was made associate professor of neuropathology in the University of Vienna He visited America in 1909 and received the honorary degree of LL D from Clark University His most important works are· *Zur Auffassung der Aphasie* (1891), *Studien ueber Hysterie*, with J Breuer (1895, 2d ed, 1908, Eng trans by Jelliffe and White, 1913), *Traumdeutung* (1900, 3d ed, 1911, trans by Brill, *Interpretation of Dreams*, 1913), *Ueber den Traum* (1901, 2d ed, 1911), *Psychopathologie des Alltagslebens* (1904, 4th ed, 1912, Eng trans, 1914), *Der Witz und seine Beziehung zum Unbewussten* (1905; 2d ed., 1912), *Drei Abhandlungen zur Sexualtheorie* (1905, 2d ed, 1910, trans by Brill, *Three Contributions to the Sexual Theory*, 1910), *Sammlung kleiner Schriften zur Neurosenlehre* (1906, 2d ed, 1911), *Zweite Folge* (1909, 3d ed, 1913), *Ueber Psychoanalyse* (1910, 2d ed, 1912), *Totem und Tabu* (1913) He also became editor of *Jahrbuch für psychoanalytische und psychopathologische Forschungen*, *Internationale Zeitschrift fur arztliche Psychoanalyse*,

Imago, and *Schriften zur angewandten Seelenkunde*

Freud's principal contributions to science have been a new method for the analysis and treatment of hysteria (psychoanalysis) and a comprehensive theory of dreams (See DREAMING) He believes that most cases of hysteria are the indirect result of a nervous shock, emotional and usually sexual in nature The ideas involved are, for various reasons, suppressed or inhibited until at length they are forgotten, i e, cannot voluntarily be recalled They find expression, however, in the hysterical state The method of psychoanalysis, which is highly technical, consists in the employment of the patient's free associations as an aid to the subsequent recall of the forgotten or submerged group of ideas When this end is accomplished, the patient is believed to be on the highroad to recovery, since the ideas, once suppressed, are now brought into connection with normal associations and the cause of the hysteria is removed Consult Freud, *Selected Papers on Hysteria*, trans by Brill (New York, 1909), Hart, "Freud's Conception of Hysteria," in *Brain* (London, 1911), *Zentralblatt fur Psychoanalyse* (Wiesbaden, 1911), Brill, *Psychoanalysis* (New York, 1913), Hitschmann, *Freuds Neurosenlehre* (Vienna, 1911), Putnam, in *Journal of Abnormal Psychology*, iv (Boston, 1909), Jones, in *Psychotherapeutics* (ib, 1909) Jelliffe and White of New York founded in 1911 an American Psychoanalytic Association and in 1913 the *Psychoanalytic Review*

FREUND, froint, WILHELM (1806–94) A German classical scholar, born of Jewish parents at Kempen, Posen. He was educated at Berlin, Breslau, and Halle, and taught at Breslau (1828–29), at Hirschberg (1848–51), and at Gleiwitz (1855–70) After 1870 he worked at Breslau His great work is the *Worterbuch der lateinischen Sprache* (1834–45), based on the great lexicon of Forcellini (q v) He wrote also *Gesamtworterbuch der lateinischen Sprache* (1844–45) and the *Lateinisch-deutsches und deutsch-lateinisch-griechisches Schulworterbuch* (1848–55) The Latin-English dictionaries by Andrews, Smith, Lewis and Short, and Riddle and White are all based upon his work Only a little less important than his lexicographical work was the valuable *Wie studirt man Philologie?* (6th ed, by Deiter, Stuttgart, 1903) He also wrote· *Tafeln der Litteraturgeschichte* (1877), *Triennium Philologicum* (3d ed, 1906 et seq), a long series of *Praparationen zu den griechischen und romischen Klassikern*, beginning in 1859, *Wanderungen auf klassischem Boden* (1889–92)

FREY, frĕy, or **FREYR** (Icel, lord) The son of Njord, of the dynasty of the Vanagods. He was adopted with his father among the Æsir, who, when he got his first tooth, bestowed upon him the celestial castle Alfheim He is the god of peace and fruitfulness, but particularly of light; dispenses rain and fertility, and to him prayers for a good harvest are addressed He wakens the earth from the sleep of winter His wife is Gerda, daughter of the giant Gymer Frey had seen her as he once ascended the lofty seat of Odin, Hlidskjalf, from which everything on earth is seen. Gerda was so beautiful that the brightness of her arms illuminated air and sea Seized with love, Frey sent Skirnir as spokesman, and for his services had to give him his sword, which he will miss in the final contest or eclipse of the gods. His magic ship *Skidbladnir*, which could be folded up like a cloth, represents the clouds that dissolve at the rays of the sun Like Freyja, he was the patron of marriage, and probably the two were at one time conceived as united hermaphroditically Frey was held in great veneration, especially in Sweden, of which he was patron god, in Norway, and from there also in Iceland His chief temple was at Upsala, where a bloody offering was yearly made to him of men and animals His festival was at the winter solstice, and while the god was borne round the land all strife was laid aside Oaths were often sworn in his name, and he was called on to avenge wrongs He is even called the god of the world and the prince of gods Both Njord and Frey are very much like Nerthus, described by Tacitus in the *Germania* as *terra mater*, possibly through a confusion of gender the feminine Nerthus became the masculine Njord Consult Paul, *Grundriss der germanischen Philologie*, iii (Strassburg, 1900)

FREY, frī, EMIL (1838–1922) A Swiss statesman He was born at Arlesheim and, after studying at Jena, came to the United States, where during the Civil War he fought with distinction in the Union army, was taken prisoner at Gettysburg, and was not released until 1865 He was advanced to the rank of major In 1865 he returned to Switzerland In the Nationalrat he was a leader of the Left in 1872–82 and President in 1875–76 He was editor of the *Baseler Nachrichten* from 1872 to 1882, when he was appointed Minister Plenipotentiary to the United States Returning in 1888, he was in 1893 elected President of the Swiss Confederation He became an active promoter of educational reform and an advocate of international legislation for the regulation of factory service He worked for the construction of the St Gotthard Tunnel and of other avenues of intercourse, the modification of the forestry laws, the extension of the fortification system, and the improvement of the army In 1897 he was made director of the International Telegraph Bureau at Bern In 1906 he was president of the first Conference for International Protection of Workingmen

FREY, FRIEDRICH HERMANN See GREIF, MARTIN

FREY, HEINRICH (1822–90) A German anatomist and zoologist He was born at Frankfort on the Main and studied medicine at Bonn, Berlin, and Gottingen In 1848 he was appointed professor of comparative anatomy and histology at Zurich, and professor of zoology at the Polytechnic Institute in that city Most of his works are devoted to histology and microscopy and are considered among the best productions on those departments of science Especially important are the following *Histologie und Histochemie des Menschen* (5th ed, 1876; Eng trans by A E J Barker, 1874); *Das Mikroskop und die mikroskopische Technik* (8th ed, 1886, Eng trans by G R Cutter, 1874), *Grundzuge der Histologie* (3d ed, 1885) He was especially skillful in researches in the subject of microlepidoptera, which topic he discusses in the works entitled *Die Tineen und Pterophoren der Schweiz* (1856) and *Lepidopteren der Schweiz* (1880).

FREY, JAKOB (1824–73) A German-Swiss editor and novelist, who wrote but little, but that of rare quality He was born at Gutenschwyl, Canton of Aargau, studied at the universities of Tubingen, Munich, and Zurich, was

editor of a paper at Aarau and afterward at Bern, and, having for some years lived at Basel, settled in 1868 at Aarau, where he died His collection of tales, *Zwischen Jura und Alpen* (1858), the novel *Die Waise von Holligen* (1863), and the three volumes of *Schweizerbilder* (1864 and 1877), are all works of distinction and artistic genius, worthy to rank with the works of Jeremias Gotthelf and Gottfried Keller Consult A Frey, *Jakob Frey, Lebensbild* (Aarau, 1897)

FREY, JOSEPH SAMUEL CHRISTIAN FREDERICK (1773–1850) An American clergyman, born at Mainstockheim (Bavaria), Germany As a Jew, he was instructed in Hebrew theology, and in 1794 became a reader in the Synagogue, but in 1798 he turned Protestant Christian and in 1800–07 was a missionary of the London Missionary Society among Hebrews in the United Kingdom In 1816 he came to the United States, in 1818 founded and was appointed pastor of the Mulberry Street Congregational Church, New York City, and in 1820 established the American Society for Ameliorating the Condition of the Jews, which worked among Hebrew immigrants He left the Congregational church to join the Baptists in 1827 and, after having occupied several pastorates in the Baptist denomination, resigned and in 1837–40 labored with little success in Europe as a representative of the American Society for the Conversion of the Jews In 1840 he returned to the United States, and later he settled at Pontiac, Mich, where he was instructor in Hebrew in the preparatory department of the University of Michigan. His publications include *A Narrative of my Life* (1809), *Judah and Israel* (1837), *A Hebrew and English Dictionary* (1839), a *Hebrew Grammar*, which passed through many editions, *Joseph and Benjamin A Series of Letters on the Controversy between Jews and Christians* (2 vols, 1842)

FREYCINET, frā'sē'nā', CHARLES LOUIS DE SAULCES DE (1828–1923) A French statesman and engineer He was born at Foix, in the Department of Ariège, and was educated at the Ecole Polytechnique in Paris In 1856 he was appointed *chef d'exploitation* of the Railway Company of the South From 1856 to 1861 Freycinet undertook several journeys in the employ of the government and published as a result of his observations an admirable work on city sanitation and another on child labor in England After the fall of the Empire Gambetta appointed Freycinet Prefect of the Department of Tarn-et-Garonne, and in October, 1870, he was associated with Gambetta as "personal delegate of the Minister of War" In this capacity Freycinet displayed remarkable energy and ability, particularly in the rapid organization of the military railway and telegraph service, and the furnishing of the staff with strategic maps. He retired after the armistice and published *La guerre en province pendant le siège de Paris* (1872), which was a defense of his administration He was elected to the Senate in 1876, was appointed Minister of Public Works in 1877, and was intrusted with the formation of a cabinet by President Grévy, in 1879, assuming the portfolio of Foreign Affairs Not being in accord with Gambetta, he resigned the premiership in 1880, but on the resignation of Gambetta in 1882, Freycinet formed a new cabinet, which resigned a few months later, upon being refused a vote of credit for the protection of the Suez Canal It was through this that France lost all her influence in Egypt In 1885, on the downfall of the Ferry cabinet, he was summoned by President Grévy to form a new ministry, but not succeeding in harmonizing the conflicting elements, he entered the cabinet formed under Henri Brisson as Foreign Minister He formed a new cabinet in January, 1886, but was forced to resign in December He was Minister of War from 1888 to 1893, being also Premier from 1890 to 1892 He went out of office, together with the rest of the cabinet, in January, 1893, as a result of the investigations into the Panama affair From November, 1898, to May, 1899, Freycinet was once more Minister of War in the Dupuy cabinet In 1887 he was elected a member of the Academy of Sciences and in 1890 a member of the French Academy He has written a number of works on engineering and mathematics, among others *Traité de mécanique rationelle* (1858) and *De l'analyse infinitésimale* (1860), also *Essais sur la philosophie des sciences* (1895), and *La Question d'Egypte* (1905) In 1914 two volumes of his *Mémoires* had appeared

FREYCINET, LOUIS CLAUDE DESAULSES DE (1779–1842) A French naval officer and navigator He was born at Montélimart in the Department of Drôme, Aug 7, 1779 Joining the navy in 1793, in 1795 he took part in several engagements against the English and Spanish In 1800 he joined, with his brother Louis Henri, who afterward rose to the rank of admiral, the expedition sent out under Captain Baudin in the *Naturaliste* and *Géographe* to explore the south and southwest coasts of Australia Much of the ground already explored by Flinders was revisited and renamed In 1805 Freycinet returned to Paris and was given an appointment in the Department of Marine Maps and Charts, in order to make maps of the territory the expedition had covered In 1817 he commanded the *Uranie*, in which Arago and others went to Rio de Janeiro to take a series of pendulum measurements This was part of a larger scheme for obtaining observations, not only in geography and ethnology, but in astronomy, terrestrial magnetism, and meteorology, and for the collection of specimens in natural history For three years Freycinet cruised about, visiting Australia, the Marianne, Hawaiian, and other Pacific islands, and South America, returning to France, notwithstanding the loss of the *Uranie*, with fine collections in all departments of natural history He published several scientific memoirs and two accounts of his travels *Voyages de découverte aux terres australes pendant les années 1800–04* (2d ed, 1824–25) and *Voyage autour du monde entrepris par ordre du roi* (13 vols, 1824–44) He was one of the founders of the Geographical Society of Paris

FREYJA, frĕy'ya (Icel, lady, fem of *Frey*), and **FRIG'GA** (woman, wife) Two goddesses in northern mythology Frigga, the older, is found among nearly all Germanic peoples, while Freyja is a later creation of the Icelandic. Frigga, in the genealogy of the Æsir (q v), is the supreme goddess, wife of Odin, and presides over marriages. Freyja is the daughter of Njord, sister of Frey, and goddess of love She is drawn on a car yoked with cats, to her deceased women go and also the half of all men that fall in battle, whence she is called Val-Freyja In this last respect she must be considered as signifying the earth, but the earth is

also represented by Frigga, the wife of Odin, and when Freyja seeks Odin, Odin symbolizes the sun The names "Frigga" and "Freyja" are in signification almost alike, and the two are often confounded in mythology The Anglo-Saxons and Lombards worshiped the wife of Odin as Frea The name yet survives, probably, in *Friday.* Consult Mortensen, *Handbook of Norse Mythology* (New York, 1913), and Craigie, *Icelandic Sagas* (ib, 1913)

FREYLINGHAUSEN, frī'lĭng-hou'zen, JOHANN ANASTASIUS (1670–1739). A German pietistic theologian and religious poet, born at Gandersheim He studied theology at Jena and in 1695 went as Francke's assistant to Halle, where he later became chief pastor and director of the Pedagogical Institute His *Compendium der christlichen Lehre* was translated into English by J Planta in 1804 under the title *An Abstract of the Whole Doctrine of the Christian Religion* His *Grundlegung der Theologie* (14th ed, 1744) was also very popular in its day It is chiefly, however, as a writer and editor of hymns that Freylinghausen is known, among his principal publications of this kind being the collection *Geistreiches Gesangbuch* (1714), containing 683 hymns, and *Neues geistreiches Gesangbuch,* containing 798 hymns These hymns obtained a wide popularity in the Protestant church service and have been frequently republished Freylinghausen is said also to have been an excellent musician.

FREYR See FREY

FREYTAG, frī'tag, GEORG WILHELM FRIEDRICH (1788–1861) A distinguished German Orientalist, born at Luneburg He studied theology and Oriental philology at Gottingen and from 1811 to 1813 acted as tutor there In 1813 he became public librarian at Konigsberg, and in 1815 chaplain in the Prussian army, in which capacity he visited Paris, and remained there after peace was proclaimed in order to continue the study of Persian, Turkish, and Arabic under the famous De Sacy In 1819 he was appointed to the professorship of Oriental languages in the recently established University of Bonn, and this post he held until his death. He edited and translated into Latin two volumes of Arabic songs, *Hamasæ Carmina* (1828–52), and edited three volumes of Arabic proverbs, *Arabum Proverbia* (1838–43) He also published a Hebrew grammar and a treatise on Arabic versification His greatest work, however, was his *Lexicon Arabico-Latinum* (4 vols, 1830–37, abridged ed, 1837)

FREYTAG, GUSTAV (1816–95) A German novelist, dramatist, and critic of distinction. He was born at Kreuzburg, Upper Silesia, July 13, 1816, studied at Breslau and Berlin, lectured on German literature as privatdocent at the University of Breslau, and after a brief residence in Dresden went to Leipzig to become editor of *Die Grenzboten* (1848–70) During this period he had published, together with other dramas of minor interest, *Die Journalisten* (1853), still often acted, one of the very few modern German comedies that can be ranked with Lessing's (q v) *Minna von Barnhelm,* the admirable novel *Soll und Haben* (1855, translated into nearly all European languages), dealing with the inevitable conflict between the spirit of caste and privilege, rooted in the feudal past of Germany, and the new industrial and democratic spirit of the age; a novel of less merit, *Die verlorene Handschrift* (1864), a valuable contribution to the theory of dramatic criticism, *Die Technik des Dramas* (1863), indifferently translated into English by McEwen (Chicago, 1894), and the most popular historical essays of his generation, *Bilder aus der deutschen Vergangenheit* (4 vols, 1859–62) From 1867 to 1870 Freytag represented Erfurt in the North German Reichstag, and during the French war he was for a time attached to the staff of the Crown Prince A journal of these days, *Der Kronprinz und die deutsche Kaiserkrone,* published in 1889, one of Freytag's few weak productions, revealed, in a way unwelcome to the court, the liberal tendencies of the deceased Frederick III and supplemented the brief autobiographic *Erinnerungen aus meinem Leben* that had accompanied Freytag's collected *Works* (22 vols, 1887–88) In his novels he was influenced by Scott and Dickens His great work after 1870 was the series of historical novels *Die Ahnen* (1872–80), a monument to the continuity of German character through all the ages of its history and already a classic in its literature To this national task Freytag gave eight of his maturest years, and he brought to it the preparation of long historic investigations. The stories reach back in *Ingo und Ingraban* to the twilight of German history and bring the reader to the Christian conversion, show in a second volume, *Das Nest der Zaunkonige,* the growing dominance of the Roman church, in a third, *Die Bruder vom deutschen Hause,* the struggles of the Teutonic Knights, and in a fourth, *Markus Konig,* the Reformation and the founding of the Prussian state The fifth, *Die Geschwister,* deals with the Thirty Years' War, and the last, *Aus einer kleinen Stadt,* with the revival of national life after the humiliations of the Napoleonic conquest They are, however, marked rather by historical learning and a thorough insight into German character than by great artistic merit While these novels were appearing, Freytag wrote much for a weekly, *Im neuen Reich,* but in 1879, *Die Ahnen* finished, he withdrew from active life and lived chiefly at Wiesbaden, where he died, April 30, 1895 His complete works were published in 22 volumes (1887–88) For his biography, consult Alberti (Leipzig, 1885), Seiler (ib, 1898), Erich Schmidt, "Dem Andenken Gustav Freytags," in *Deutsche Rundschau,* xxi (Berlin, 1895); E Elster, "Gustav Freytag," in *Biographisches Blatter,* ed by Bettelheim, vol ii (Berlin, 1896)

FRIANT, frē'aN', LOUIS, COUNT (1758–1829) A French general, born at Villers-Morlancourt, Somme After participating in the wars of the French Revolution he accompanied Napoleon as brigadier general to Egypt in 1798 and was appointed Governor of Upper Egypt by Kléber He fought with distinction at Heliopolis (March 20, 1800) and Cairo and was appointed general of division, but after a futile defense of Alexandria was compelled to surrender to the allied armies of England and Turkey (August, 1801) The title of Count was conferred on him at the coronation of Napoleon He participated in nearly all the great battles of the Napoleonic wars, from Austerlitz to Waterloo, particularly distinguishing himself at Borodino Consult the *Vie militaire* (Paris, 1857), by his son, Gen Jean François Friant

FRI'AR (OF *frere, freire,* Fr. *frère,* Sp *fray, fraile,* It *frate,* from Lat. *frater,* brother) A generic name applied to the members of cer-

tain comparatively modern religious communities in the Roman Catholic church, in contradistinction to the older title of monk, which designated especially the Benedictines and their branches Friar belongs to the members of the four great orders—Franciscan, Dominican, Carmelite, and Augustinian, and of the lesser orders These orders, unlike those of the monks, are devoted primarily to service in some form, and their vow of poverty originally applied to the order, as well as the individual, so that they must beg their food and became known as mendicant orders Their founders, from motives of humility, chose the simple title of brother to designate their followers St Francis called his *fratres minores*, friars minor (lesser brothers), while St Dominic gave his order the name of *fratres prædicatores* (preaching friars) The popular names of these orders were derived from the color or other distinguishing mark of their habit—such as gray friars (Franciscans), black friars (Dominicans), white friars (Carmelites), crutched friars (Canons Regular of the Holy Cross), and Austin friars (Augustinians) See MONASTICISM

FRIAR BACON A popular title for Roger Bacon It is employed in a play by Robert Greene, entitled *The Honorable History of Friar Bacon, and Friar Bungay*, printed by Edward White in quarto (1594) A prose work, first printed in 1627, was reprinted in Thoms's *Early English Prose Romances* (Pickering, London, 1828), under the title of *The History of Friar Bacon*

FRIAR BIRD (so called from its bare head, the ruff of feathers about its head, and its sober plumage) A well-known Australian honey eater (*Philemon*, or *Tropidorhynchus, corniculatus*). It also has other names, as "Pimlico" and "Four o'clock," imitative of its loud cry Several closely related forms inhabit the Malayan islands to the north of Australia All are dull drab in color, have the head and neck more or less bare of feathers, and the culmen of the large curved bill furnished with an excrescence They inhabit the tree tops, go in small flocks, and are strong, bold, noisy birds An interesting circumstance connected with them is the fact that in each island where a local species exists there also exists an oriole which "mimics" its appearance perfectly (see MIMICRY) and thereby escapes much harm from enemies that might easily overcome it did they not mistake it for the more powerful friar bird Consult Wallace, *Darwinism* (London, 1889)

FRIAR BUNGAY See BUNGAY, FRIAR

FRIAR RUSH See RUSH, FRIAR

FRIAR'S BALSAM The popular name for compound tincture of benzoin, of the United States Pharmacopœia, it is also applied to a similar preparation, Balsamum traumaticum Friar's balsam is used as a dressing for wounds and ulcers, being stimulating and antiseptic See BENZOIN

FRIAR'S TALE, THE In Chaucer's *Canterbury Tales*, the tale told by the friar Hubert

FRIAS, frē'as, TOMÁS (1805–84) A Bolivian statesman, born at Potosí He was Secretary of State under several presidents, and after the assassination of Morales, in 1872, he was selected to conduct the affairs of the government as acting President He was elected Vice President in 1873, and upon the death of President Ballivian succeeded to the presidency (Feb. 14, 1874). His administration was progressive and undisturbed Two years after the completion of his term of office (1877) he was sent as Minister to France He was one of the foremost of South American statesmen

FRIBOURG, frē'boor', or **FREIBURG,** frī'burk A canton in the western part of Switzerland (Map Switzerland, B 2) It has an area of 646 square miles The southeastern part is high and may be said to belong to the Bernese Oberland region, the northwestern part belongs to the basin of Lake Neuchâtel The main rivers are the Saane and the Broye The mountain forests furnish wood for export, limestone, gypsum, and pitch coal are found Of the total area 88 per cent is productive Grain, fruit, potatoes, tobacco, and grapes are grown Dairy products, especially cheese, are exported Fribourg produces a fine grade of draft horses and gives its name to an excellent breed of black cattle. Its manufactures are not important They include watches, paper, tobácco and cigars, glass, and products of the loom Straw plaiting and tanning are leading industries The canton is administered by a Grand Council, elected by the people It sends seven representatives to the National Council Pop, 1900, 127,628, 1910, 139,200 The inhabitants are mostly Roman Catholics French is the official language, although legislative measures are published also in German The canton is on the line separating the German and French speaking population of Switzerland The educational institutions comprise the university at the capital, Fribourg (q v), a seminary, a college, and many secondary, elementary, and industrial schools The ancient dwellers of the land were the Celtic Helvetii During the great barbaric migrations the district was occupied by the Alemanni in the east and the Burgundians in the west In the sixth century it came into the possession of the Franks It passed under the control of the Holy Roman Empire in 1032 The inhabitants refused to allow the spread of Protestantism within their borders In 1798 the French occupied the land, and it remained under French influence till 1814. The canton, which has always been ultramontane and conservative, is the only one without the referendum and with restricted popular rights Consult Berchtold, *Histoire du canton de Fribourg* (Freiburg, 1841–45), and Marrot, *Chronique du canton de Fribourg* (ib, 1878)

FRIBOURG, or **FREIBURG** The capital of a canton of the same name, Switzerland, situated on the Saane, 19 miles southwest of Bern, on the main line of railway between Berne and Lausanne (Map Switzerland, B 2) The town stands on a promontory, is ancient, and is irregularly built, with many walls and towers The river is crossed by a number of fine bridges, including two of the suspension type, of which the larger, built in 1832, is 808 feet long The most notable buildings are the church of St Michael, formerly belonging to the Jesuits, and the town hall, with its Gothic clock tower Among the educational institutions are the university (founded in 1889), the College of St Michael, and the lyceum, containing the cantonal museum A dam 590 feet long across the Saane immediately above the town supplies about 4000 horse power The chief manufactures of the town are tobacco, pasteboard, leather, and artistic objects Pop, 1900, 15,794, 1910, 20,394

FRIČ, or **FRITSCH,** frīch, ANTON JOHANN

(1832–1914) A Bohemian geologist and zoologist, brother of Joseph Václav Frič, born and educated at Prague He became professor in the Czech University at Prague (1863) and was also director of the zoological and paleontological department of the Museum of Bohemia Among his writings are *Les oiseaux d'Europe* (1832), *Naturgeschichte der Vogel Europas* (1853–71), *Cephalopoden der bohmischen Kreideformation* (1872), *Geologische Bilder aus der Vorzeit Bohmens* (1873), *Die Reptilien und Fische der bohmischen Kreideformation* (1878), *Fauna der Gaskohle und der Kalksteine der Permformation Bohmens* (4 vols, 1879–99), *Fischereikarte des Konigreichs Bohmen* (1888), *Der Elbelachs* (1894).

FRIČ, Joseph Václav (1829–90) A Bohemian poet, born in Prague Because he took active part in the risings of 1848–49 he was punished by imprisonment and exile He went to London in 1859, then to Paris and to Berlin, and in 1879 returned to Prague His literary productions, which do not rise above mediocrity, include *Pláč koruny české* (The Wail of the Czech Crown, 1866), contributions to the Czech periodicals *Blanik* and *Correspondance tchèque* and to the *Agramer Zeitung* (1870–77), the historical work, with Léger, *La Bohème historique, pittoresque, et littéraire* (1868), the dramas *Svatopluk, Ulryk Hutten,* and *Mazeppa,* an almanac, *Lada Niola* (1885), and lyric poems in a Byronic manner, of which *Upír* (The Vampire, 1849) is the best example His collected works, *Sebrané spisy,* were published at Prague (1879–80), and his *Memoirs* appeared in four volumes (Prague, 1885–87) He frequently used the pseudonym "Brodský"

FRICK, Henry Clay (1849–1919) An American manufacturer and capitalist, born at West Overton, Pa At the age of 19 he became bookkeeper in a flouring mill at Broad Ford, in the centre of the Connelsville territory He early took an interest in the possibilities of the coking industry, then in its infancy, and in 1871 organized the firm of Frick and Company with 300 acres of coal lands and 50 ovens—one-eighth of the total number in the Connelsville region In the panic of 1873 the coking industry suffered severely Frick had the sagacity to acquire the properties of his hard-pressed competitors, as well as the interests of his partners, thus laying the foundation for his later control of the industry. By 1889 he controlled 35,000 acres of coal lands and 15,000 ovens, representing two-thirds of the capacity of the region. This control of the fuel supply placed him in a position to enter into an alliance, on extremely favorable terms, with the rising Carnegie steel firm In 1889 he became chairman of the board of managers of that company and was thereafter one of the chief influences in its development and during the year 1892 became director of several important corporations During the Homestead strike of 1892 an attempt on his life was made by Alexander Berkman, the anarchist. In 1897 he was made chairman of the board of directors of the H C Frick Coke Company, which was soon the largest coke-producing company in the world In 1905 he was head of a committee appointed to draw up a plan of reform in connection with the management of the Equitable Life Insurance Company.

FRICTION (Lat. *frictio,* a rubbing, from *fricare,* to rub). If a solid body with a flat surface rests on a horizontal table, it requires a definite force to start it moving, and if it is set in motion, it will come to rest unless acted upon by a sufficient force These phenomena are said to be due to the force of "friction" between the two surfaces It is found by experiment that the force required to start the motion of one body over the other varies directly as the force pressing the surfaces together, but is independent of the area of contact The ratio of the force required to produce motion to the force pressing the surfaces together is called the "coefficient of statical friction" It varies largely for different kinds of material and is always diminished by lubricants.

Similarly, if one body is caused to slide over the other, a definite force is required to prevent its motion being retarded, in other words, a force is required to maintain a uniform speed This force bears a definite ratio to the force pressing the surfaces together, which is called the "coefficient of kinetic friction" and is independent of the area of contact This coefficient is different for different materials and for the same substances is less than "the coefficient of statical friction" It is independent, further, within certain limits of the degree of speed Some values of this coefficient of kinetic friction are as follows, oak on oak, fibres parallel, 0 48, the same, with surfaces rubbed with dry soap, 0 16, iron on oak, fibres parallel to motion, 0 62, iron on iron, surfaces well lubricated, 0 04

The resistance noticed when a wheel rolls on a plane surface with no slipping is not a true case of friction, although it is sometimes called "rolling friction" It is due to the plane surface becoming deformed and rolled up in front of the advancing wheel or to the wheel itself flattening out This opposition is, however, in most cases extremely small, when compared with sliding friction Whenever work is done in overcoming friction, the surfaces which are rubbed over each other experience heat effects, and thus friction always causes loss of available mechanical energy On the other hand, without friction most motions would be impossible—e g, a man walking, a belt driving a pulley, a train moving on a track, etc If there were no friction, all these motions would necessarily be produced by cogwheels or their equivalents

Friction between solids is due to slight unevennesses on the surfaces in contact and is therefore what may be called a force between the minute portions of the bodies, and heat effects are produced The exact mechanical explanation is not evident In the case, however, of friction between moving layers of liquids or gases, it is. It is known that all molecules of these forms of matter are moving about at random through distances which are considerable with respect to their own size, if, then, a layer of fluid is moving relatively with reference to a contiguous layer—e.g, the currents produced in a tumbler of water by stirring a spoon in it, or the currents of air produced by whistling—molecules move freely from one layer into the other. The effect is exactly that of having two long trains of cars, or movable platforms, on parallel tracks—one train in motion, the other not; if enough people step back and forward from one train to the other, the moving one will be slowed up, the one at rest will be set in motion, and finally both trains will be moving at the same speed If one train is kept at rest, the other will be brought to rest also Thus, moving layers of liquids and gases are brought to rest.

The kinetic energy of the currents goes into increasing that of the molecules, and the temperature is raised Friction between layers of fluids is sometimes called "viscosity," and a fluid is said to be "viscous" if this frictional force is large

There is thought to be little, if any, friction between a fluid and a solid, when, e g, the fluid is flowing through a pipe or tube in case the fluid "wets" the solid, in general there is a layer of the fluid close against the solid and attached to it, so that any friction is between this layer and the rest of the fluid

Still another case of friction is to be considered—that between portions of a solid body when it is making elastic vibrations, e g, a vibrating tuning fork When any solid is deformed, there is always to a greater or less degree a slipping of layers of the solid over each other, and thus there is produced "internal" friction Owing to this, the energy of vibration of the body decreases, the vibrations cease, and the body as a whole has its temperature raised Consult Thurston, *Treatise on Friction and Lost Work in Machinery and Millwork* (7th ed, New York, 1903), Davis, *Friction and Lubrication* (2d ed, Pittsburgh, 1904), Loffler, *Mechanische Triebwerk und Bremsen* (Munich, 1912)

FRIDA, frē'da, EMIL BOHUSCH (1853–1912). A leading Czech poet and dramatist, whose pen name was Jaroslav Vrchlický He was born at Laun, Bohemia, was educated at Prague, and was appointed professor of literary history in the Czech University there in 1893 In 1901 he was called to the Austrian House of Peers For his talent and versatility Frida has been compared to Victor Hugo His poetic works comprise epics, tragedies, comedies, several novels, and translations from the best writers of France and Italy. Many selections from his works have been translated into German In English appeared his one-act play, "At the Chasm," in *Poet Lore*, vol. XXIV (1913).

FRI'DAY (AS *frigedæg, Frigdæg*, OHG *Friatag*, Ger *Freitag*, from AS *Frige*, OHG. *Fria*, Icel *Frig*, a goddess partly identified with the Roman Venus + AS *dæg*, Ger. *Tag*, day, a German translation of the Latin name *dies Veneris*, day of Venus, whence It *venerdì*, Fr *vendredi*, Friday) The sixth day of the week. Among the Germanic peoples it was sacred to the goddess named above, the wife of Odin In the Christian Church it was in very early times consecrated to the commemoration of the crucifixion of Christ, which took place on that day (See GOOD FRIDAY) The superstition that Friday is an unlucky day may probably be traced to association with this event Clement of Alexandria, Epiphanius, and other early writers show that it was already marked by fasting and prayer In the Roman Catholic church it has always and everywhere been a day of abstinence from flesh meat, except when Christmas falls on a Friday The Anglican churches also designate all Fridays (with the same exception) as days of fasting or abstinence Since the spread of the devotion to the Sacred Heart of Jesus in the last two centuries, the first Friday of every month has been a day marked for devout Roman Catholics by special observances in honor of it Among the Mohammedans it is the day for religious gatherings, said to have been chosen by Mohammed in memory of the creation of man, as well as to differentiate his followers from Jews and Christians They are not required to rest from labor except during the time of the Friday midday prayer, at which all adult males are required to be present

FRIDAY In Defoe's *Robinson Crusoe*, a savage whom Robinson Crusoe saved from death on Friday, and who became his faithful servant

FRIDAY CLUB, THE A social club, started by Sir Walter Scott, in June, 1803 It met at Fortune's Tavern and was probably modeled on Johnson's famous club at the Turk's Head A list of the members is given in Lockhart's *Life of Scott*, vol ii (Edinburgh, 1850)

FRIDERICIA, frē'dā-rē'sē-a, JULIUS ALBERT (1849–) A Danish historian He was born and educated at Copenhagen and was appointed assistant librarian at the university library in that city in 1891 and professor of history in 1899 Many of his works are based upon a careful study of the archives of Denmark, Sweden, Holland, England, Germany, France, and other European countries His principal works comprise *Danmarks ydre politiske Historie i Tiden fra Freden i Lybek til freden i Bromsebro, 1629–60* (1876–82), and *Adelsvaldens sidste Dage, Danmarks Historie fra Christian IV's Død til Enevældens Indforelse* (1894), *Revolutionen og Napoleon I 1789–1815* (1903) With Bricka he published *Christian IV's egenhændige Breve* (1878–91)

FRIDIGERN See FRITIGERN

FRIDOLIN, fre'dō'lĭn', or **FRIDOLD,** frē'-dōlt (less frequently TRIDOLIN, or TRUDELIN), SAINT A Christian missionary of the sixth century, called "the First Apostle to Allemania" All that is known of him was written four centuries later by Balther, a monk, whose biography of the saint contains a great amount of legend intermingled with historical fact He was an Irishman, who, after labors among his heathen country folk, went to Poitiers, where he restored the church of St Hilary, much impaired through Arian heresy, to its former prosperity He afterward founded a church and a monastery on the island of Sackingen in the Rhine He is the patron saint of the Canton of Glarus, Switzerland, on whose coat of arms he appears His day is March 6 An edition of Balther's *Life* is contained in Mone's *Quellensammlung der badischen Landesgeschichte*, vol i (Karlsruhe, 1845) Consult also Heber, *Die vorkarolingischen Glaubenshelden* (Gottingen, 1867), and Heer, *Sankt Fridolin, der Apostel Alemanniens* (Zurich, 1888)

FRIED, frēt, ALFRED HERMANN (1864–1921) A German publicist and advocate of international peace He was born in Vienna, but about 1883 settled in Berlin, where he was first a bookseller and then an author Having devoted himself to the peace movement in 1891, he founded the German Peace Society in 1892 and became editor of the *Friedenswarte* (founded 1899) In 1911 he received part of the Nobel award for peace Among his many published works are *Friedenskatechismus* (1895), *Tagebuch eines zum Tode Verurteilter* (1898, in English, 1899), *Lasten des bewaffneten Friedens und des Zukunftskrieg* (1902), *Handbuch der Friedensbewegung* (1905, 2d ed, 1911); *Die moderne Friedensbewegung* (1906), *Pan-Amerika* (1910); *Der kranke Krieg* (1910), *Der Kaiser und der Weltfrieden* (1910, Eng version, 1912)

FRIED, OSKAR (1871–) A German composer and conductor, born in Berlin, Aug

10, 1871 Owing to adverse circumstances, he was obliged to pick up a scanty musical education as best he could, playing for many years in inferior orchestras While a hornist in the opera orchestra of Frankfort, he attracted the attention of Humperdinck, from whom he received the first systematic instruction in composition In 1900 he returned to Berlin, where he completed a thorough course in counterpoint under Philip Scharwenka As a composer, he scored his first great success in 1904 with *Das trunkene Lied*, op 11, for soli, chorus, and orchestra, a work of real power, exhibiting at the same time masterly contrapuntal and canonic skill In 1907 he became conductor of the *Steinscher Gesangverein* in Berlin, and in 1910 he organized a symphony orchestra for the purpose of producing the latest orchestral works As a leader of both choral and orchestral forces, he soon became famous His principal works are a prelude and double fugue for string orchestra, op 10, the great choral works with orchestra, *Verklarte Nacht*, op 9, *Das trunkene Lied*, op 11, *Erntelied*, op 15, andante and scherzo for wind instruments and two harps, op 2, and very remarkable songs published as op 1, 3, 4, 5, 7, 8 Consult H Leichtentritt, *Oskar Fried* (Leipzig, 1906), and P Bekker, *Oskar Fried Sein Werden und Schaffen* (Berlin, 1907)

FRIEDBERG, frēt'bĕrk, EMIL ALBERT (1837–1910) A German canonist He was born at Konitz, West Prussia, and was educated at Berlin and Heidelberg After having been a member of the faculty at Berlin, Halle, and Freiburg, he was appointed professor at Leipzig in 1689 The new critical edition of the *Corpus Juris Canonici* (1879–81) was prepared by him, as was also the *Formelbuch des deutschen Handels-, Wechsel- und Seerechts* (3d ed, 1894) Alike in his collaboration in the Prussian church laws of 1872 and as an author, he showed himself a champion of state supremacy in ecclesiastical matters, and many of his works deal with this subject in its various bearings Perhaps the best known of his numerous publications are the following *Die Geschichte der Zivilehe* (2d ed, 1877), *Lehrbuch des katholischen und evangelischen Kirchenrechts* (5th ed, 1903), *Verfassungsgesetze der evangelisch-deutschen Landeskirchen* (1885 et seq)

FRIEDEL, frē'dĕl', CHARLES (1832–99) A French chemist and mineralogist, born at Strassburg He was educated at the Protestant gymnasium and subsequently studied, under Pasteur, at the University of Strassburg After spending a short time in his father's banking business he went to continue his studies in Paris, where he resided with his grandfather, the celebrated zoologist Duvernois After a thorough preparation in the mathematical sciences he entered the laboratory of Wurtz, with whom he soon formed a close friendship In 1869 he presented two remarkable theses, one in organic chemistry and one in mineralogy, which immediately attracted to him the attention of the scientific world In 1871 he became instructor in mineralogy at the Ecole Normale Supérieure and in 1876 succeeded Delafosse as professor of mineralogy at the Sorbonne Two years later he succeeded Regnault as member of the Institute On the death of Wurtz, in 1884, Friedel was appointed professor of organic chemistry and director of the research laboratory at the Sorbonne, a position which he retained to the end of his life In 1892 he organized and became director of the Ecole de Chimie, a school of industrial chemistry connected with the University of Paris Friedel's researches contributed extensively to the development of organic chemistry and synthetic mineralogy The results embodied in his 254 original memoirs have, without a single exception, joined the structure of science as valuable and indisputably correct data His classic researches on the ketones, his discovery of the secondary alcohols, his total synthesis of glycerin, his discoveries of many new mineral species and of methods of reproducing many minerals artificially, his discovery of the pyroelectric properties of minerals, his researches on the chemistry of silicon and its organic compounds, and his discovery, jointly with James Mason Crafts, of the synthetic method well known as "the Friedel and Crafts reaction," entitle him to a distinguished place among experimental scientists The Friedel and Crafts reaction consists in the action of various chlorinated compounds on aromatic hydrocarbons in the presence of aluminium chloride, thousands of different organic compounds being thus conveniently prepared on any ordinary scale As to the compounds of silicon, Friedel, working in conjunction, partly with Crafts, partly with Ladenburg, showed that the element silicon is, like carbon, quadrivalent, and obtained a series of compounds perfectly analogous to the hydrocarbons and capable of yielding many substances perfectly analogous to derivatives of the hydrocarbons Friedel's book-form publications include a textbook of mineralogy and crystallography, and a work on organic chemistry, entitled *Cours de chimie organique professé à la faculté des sciences de Paris* (2 vols, 1887)

FRIEDELITE, frē-dĕl'īt A crystalline mineral magnesium chlorosilicate discovered by Bertrand in the mines of Adervielle It has a dark-red color and is translucent It was named in honor of Charles Friedel (q v)

FRIEDENTHAL, frē'den-tal, KARL RUDOLF (1827–90) A German statesman He was born at Breslau and was educated at Breslau, Heidelberg, and Berlin He became a member of the North German Reichstag in 1867 and was one of the founders of the Free Conservative party He was a member of the conference convened at Versailles during the Franco-German War to assist in framing the constitution of the new German Empire In 1874–79 he was Minister of Agriculture and then became a member of the House of Lords His influence upon the economic development of the German Empire was most important

FRIEDENWALD, frē'den-wald, HERBERT (1870–) An American writer on historical subjects, born at Baltimore, Md He graduated at Johns Hopkins University in 1890 and received his Ph D from the University of Pennsylvania in 1894 From 1897 to 1900 he was chief of the division of manuscripts of the Library of Congress He edited the *American Jewish Year Book* in 1908–13, was secretary of the American Jewish Committee in 1906–13, and became recording secretary of the American Jewish Historical Society. His writings include *Material for the History of the Jews in the British West Indies* (1897), *Some Newspaper Advertisements of the 18th Century* (1897), *Historical Manuscripts in the Library of Congress* (1898), *A Calendar of Washington*

MSS in the Library of Congress (1901), *The Declaration of Independence. An Interpretation and Analysis* (1904)

FRIEDERICIA See FREDERICIA

FRIEDERIKE VON SESENHEIM, frē'dĕr-ē'ke fŏn sā'zen-hīm See BRION, FRIEDERIKE ELISABETH

FRIEDHEIM, frēt'hīm, ARTHUR (1859–) A distinguished German pianist, born in St Petersburg, of German parents Although he appeared as a virtuoso when only nine years of age, he did not give his entire time to music, but completed the regular courses of the German gymnasium and university In 1880–82 he studied with Liszt in Rome After an activity of several years as conductor at various smaller theatres, he studied once more with Liszt in Weimar His real career as a pianist began in the United States about 1890, but recognition came very slowly Excess of temperament led him to hammer unmercifully, rendering his playing colorless When he gradually gained in artistic moderation, the many excellent qualities of his playing appeared, chief among which is wonderful tone color During his extensive tours in Europe he soon became famous as perhaps the greatest Liszt player, and as such he was acknowledged also in America when he returned in 1910 In 1908 he settled in Munich As a composer, he became known through a concerto for piano and orchestra in B flat and an opera, *Die Tanzerin*, produced in Cologne in 1905

FRIEDLAND, frēt'lant, *Eng pron* frēd'land A town of East Prussia, on the left bank of the Alle, 26 miles southeast of Konigsberg (Map Germany, J 1) It is celebrated as the scene of one of Napoleon's most splendid victories, gained over the Russians under General Bennigsen, June 14, 1807 On June 10 the corps of Soult, Lannes, and Murat had delivered an attack on the Russian intrenchments at Heilsberg and had been repulsed with a loss of nearly 10,000 men Napoleon thereupon swung his army to the north of Heilsberg and took up the march for Konigsberg, hoping by this manœuvre to entice the Russian commander from behind his fortifications On the 11th Bennigsen abandoned Heilsberg, and for three days, till the 13th, the two armies were engaged in a race for the threatened town, the Russians advancing by the right bank of the Alle, the French to the left of the river and at some distance away. On June 13 the corps of Murat and Davout were in the neighborhood of Konigsberg, Soult was at Kreutzburg, about 10 miles south of Konigsberg, and Lannes was at Domnau, some 15 miles southeast of Kreutzburg Napoleon, with the Guard and the corps of Victor, Ney, and Mortier, was at Preussisch-Eylau, about 5 miles from Domnau Early in the morning of June 14 Bennigsen began the crossing of the Alle at Friedland, in the hope, probably, of surprising Lannes s isolated corps Had the passage of the river and the attack on Lannes been carried out with rapidity and decision, victory would have certainly resulted for the Russians But Bennigsen's dilatoriness and Lannes's intrepid resistance allowed time for Napoleon to arrive on the field of battle with the main body of troops and to turn the advantage of numbers in favor of the French, 70,000 against 55,000 The position of the Russians was perilous in the extreme, with the greater part of their forces hemmed in within a narrow arc of the Alle curving behind them In case of disaster their only means of retreat were the bridges across the Alle at Friedland Against these bridges, as the key of the situation, Napoleon directed his attack Mortier, on the left wing, was ordered to content himself with merely holding the enemy in check, while Ney, on the right, was sent against Friedland The battle began about six o'clock in the afternoon Ney advanced to the attack under cover of a heavy artillery fire, but his ranks were immediately thinned under a withering cannonade and were thrown back in utter confusion by a smashing charge of the Russian Household Cavalry The corps of Victor and the division of General Dupont were thrown into the breach, while Senarmont with 30 guns took up a position 100 yards in front of the infantry line and drove back the Russian cavalry, gaining time for Ney to rally his division A charge by Latour-Maubourg's dragoons and a further advance of Senarmont's batteries decided the fate of the battle The Russians fled through Friedland pursued by Ney and Dupont, a part of the army with 120 guns reaching the right bank of the Alle before the bridges were burned The Russian right, meanwhile, under Gortchakoff, had been skirmishing with Mortier, upon the retreat of Bennigsen, Gortchakoff attempted to retake Friedland, but, failing, was forced to move northward along the river in search of a fording place, losing one-third of his men in the passage of the river The loss of the Russians in the battle was nearly 20,000 killed and wounded, the French loss was less than half that number On June 19 Konigsberg fell into the hands of the French, and on June 25 occurred the meeting between Napoleon and the Emperor Alexander at Tilsit (q v) Pop, 1910, 3029. Consult Johnston, *Napoleon A Short Biography* (New York, 1904)

FRIEDLAND, SAGAN AND MECKLENBURG, DUKE OF See WALLENSTEIN

FRIEDLAND, VALENTIN (1490–1556). A German educator, generally called Trotzendorf, from the little village in Upper Lusatia where he was born, Feb 14, 1490 He taught for a time in the school at Gorlitz, soon after obtaining his baccalaureate from the University of Leipzig, but, adopting the principles of Luther and Melanchthon, he was obliged in 1518 to give up his instructorship In 1523 he became rector of the gymnasium at Goldberg in Silesia for a brief period, he came a second time to Goldberg in 1531, in the same capacity, and remained for over 20 years, making the school so famous throughout Europe that it often had several hundred pupils at once The school administration was modeled on that of the Roman Republic, thus affording a measure of self-government among the pupils, and Latin was the only language allowed in and out of school The complete destruction of the buildings by fire in 1554 compelled a removal to Liegnitz, and here Friedland, while superintending the erection of new buildings at Goldberg, died, April 26, 1556 For his biography, consult Pinzger (Hirschberg, 1825) and Loschke (Breslau, 1856)

FRIEDLANDER, frēt'lĕn-dēr, DAVID (1750–1834) A German Hebrew scholar. He was born in Konigsberg, Prussia, and was attracted to Berlin by the reform movement under Mendelssohn There he devoted himself to the emancipation of the Jews and labored assiduously to improve their condition. He was the

first Jewish member of the Berlin city council He contributed to Mendelssohn's greatest biblical work, *Das Buch Kohleleth* (1772), and also published *Aktenstuche, die Reform der judischen Kolonie in den preussischen Staaten betreffend* (1793), *Sendschreiben an den Propst Teller von einigen Hausvatern judischer Religion* (1799), *Ueber die Verbesserung der Israeliten im Konigreich Polen* (1819)

FRIEDLANDER, (C GOTTFRIED) IMMANUEL (1871–) A German geologist, born in Berlin, and educated there, at the University of Kiel, and at the Zurich School of Technology He traveled in North America, Hawaii, and Samoa in 1893–94, in the Canary Islands in 1896, in Madeira in 1897, in Mexico in 1906, in Fiji and Samoa in 1907, in Japan in 1908–09, and in the Cape Verde Islands in 1912 His interest was especially in volcanoes, and in 1910, at the International Geological Congress in Stockholm, he urged the establishment of a vulcanological institute at Naples, where he had lived since 1901, studying Vesuvius, and where in 1913 he built a private institute and established the *Zeitschrift fur Vulkanologie* His writings on volcanoes and precious stones (particularly the relationship of the genesis of diamonds, etc, to volcanic action) were published mostly in technical journals.

FRIEDLANDER, JULIUS (1813–84) A German numismatist He was born in Berlin and was educated at Bonn and Berlin During the last 30 years of his life he was director of the cabinet of coins in the Berlin Museum, which establishment was greatly enlarged under his management He edited the *Aufsatze und Briefe* of G Schadow (2d ed, 1890) and published works on the coins of the Knights of St John (1843), the coins of Justinian (1843), and on those of the Ostrogoths (1844) and Vandals (1849), also a monograph entitled *Das konigliche Munzkabinett* (with Sallet, 2d ed, 1877)

FRIEDLANDER, LUDWIG (1824–1909) A German classical scholar and archæologist, born at Konigsberg He was educated at the gymnasium of his native town and at the universities of Leipzig and Berlin He became privatdocent at Konigsberg in 1847 and full professor in 1858 In 1892 he retired and lived thereafter in Strassburg Friedlander's studies were chiefly concerned with Roman archæology and the history of Homeric criticism His most important works are *Die homerische Kritik von Wolf bis Grote* (1853), *Analecta Homerica* (1859), *Ueber den Kunstsinn der Romer in der Kaiserzeit* (1852), *Darstellungen aus der Sittengeschichte Roms, etc* (8th ed, 1910), an edition of Martial (1886), an edition of the *Cena Trimalchionis* of Petronius (1895, 2d ed, 1906), and an edition of Juvenal (1895) His editions of Latin authors are especially strong on the side of antiquities, i e, of Roman life and manners His *Sittengeschichte* has been translated into English, as *Roman Life and Manners under the Early Empire* (4 vols, London, about 1910–13)

FRIEDLANDER, MAX (1852–) A prominent German musical scholar, born at Brieg (Silesia) He gave up a business career to study singing with Garcia in London and Stockhausen in Frankfort In 1880 he made his début as a concert singer (bass) in London Soon his interest in the history of music engrossed his attention, and when, after settling in Berlin in 1883, he met Spitta (q v), he was stimulated to begin original research He abandoned his career as a singer and in 1887 received the degree of Ph D from the University of Rostock In 1894 he became instructor in the science of music at the University of Berlin, in 1903 professor While gathering materials for an exhaustive biography of Schubert, he discovered more than 100 lost songs of that master and many old folk songs, all of which he published Among the most valuable of his writings are *Goethe's Gedichte in der Musik, Gedichte von Goethe in den Kompositionen seiner Zeitgenossen,* and *Das deutsche Lied im 18 Jahrhundert* In 1912 he visited the United States on a lecturing tour

FRIEDMANN, frēd'man, ALFRED (1845–1923) A German novelist and poet He was born at Frankfort on the Main, was educated at Heidelberg and Zurich, and became established at Berlin in 1886 He became known alike as a poet and novelist, his poetic productions being characterized by a thorough mastery of form and diction His works include *Die Feuerprobe der Liebe* (a humorous epic, 3d ed, 1879) *Angioletta,* two poems (3d ed, 1879), and the novel *Zwei Ehen* (3d ed, 1890) His more recent novels are entitled *Inez de Castro* (1898), *Tantalus* (1901), *Die letzte Hand* (1902), *Tantalus, Vorurteil, Vier Liebhaber der Marquise* (1905)

FRIEDMANN, MEIR BEN JEREMIAH (1831–1908) A Hungarian Jewish scholar, born at Kraszna, Hungary, and educated in the yeshibah at Ungvar and at the University of Vienna He was a professor in the Hebrew Theological Seminary of Vienna, and coeditor of the *Bet Talmud* in 1881–86 He is known chiefly for his editions of the Midrashim texts, which include *Sifre* (1864), *Mekilta* (1870), *Pesikta Rabbati* (1880) He also published *Eshet Hayil* (1878), *Ha Ziyyon* (1882), *Sefer Shofetim* (1891), *Tanna debe Eliyahu* (1900)

FRIEDREICH, frēd'rīk, NIKOLAUS (1825–82) A German physician, born at Wurzburg and educated in that city and at Heidelberg In 1857 he was appointed professor of pathology in the University of Wurzburg and director of the Anatomical Institute From 1858 until his death he held the chair of pathology and therapeutics at Heidelberg and was clinical director there In addition to "Die Krankheiten der Nasenhohlen, des Larynx und der Trachea," in Virchow's *Handbuch der speciellen Pathologie* (1854), he published a valuable work on cardiac diseases, entitled *Die Krankheiten des Herzens* (2d ed, 1867)

FRIEDRICH, frē'drīk, JOHANNES (1836–1917) A German theologian and historian, prominent as a leader of the Old Catholics He was born at Poxdorf, studied at the universities of Bamberg and Munich, was ordained a Catholic priest in 1859, and in 1865 became professor of theology in the University of Munich, and in 1867 a member of the Academy of Sciences The most noticeable of his works is the *Kirchengeschichte Deutschlands* (1867–69) He was a pupil of Dollinger and in 1869 was called to the Vatican Council at Rome His *Tagebuch wahrend des Vatikanischen Konzils gefuhrt* (1871) and *Documenta ad Illustrandum Concilium Vaticanum* (1871) are important sources of information concerning the proceedings This council indorsed the papal infallibility dogma,

which Friedrich with Dollinger strongly opposed Friedrich was consequently excommunicated in 1871, and in 1882 the Minister of Public Worship, yielding to Ultramontane pressure in the Chamber, transferred Friedrich from the chair of theology to that of history He opened in 1874 the Old-Catholic theological faculty at the University of Bern and lectured there for a year Among his works may be mentioned *Der Mechanismus der vatikanischen Religion* (1876), *Geschichte des Vatikanischen Konzils* (1877–87), *Beitrage zur Geschichte des Jesuitenordens* (1881), *Johann Adam Moller, der Symboliker* (1894), *Jacob Frohschammer* (1896), *I von Dollinger* (1899–1901)

FRIEDRICH, JOHN (1858–) An American violin maker, born at Cassel, Germany He was a pupil of Oswald Mockel, a prominent German violin maker and repairer, came to the United States in 1883, and in a short time ranked among the American leaders in his profession In addition to violins he has made also bows, violas, and violoncellos of high quality He received the highest award bestowed for violins, violas, and violoncellos at the World's Columbian Exposition, Chicago, 1893 He has also become known among collectors as an expert in the identification and valuation of rare instruments Four of the choicest specimens of his violins are in the possession of Dr Frank Waldo, of Cambridge, Mass

FRIEDRICH, KASPAR DAVID (1774–1840) A German landscape painter He was born at Greifswald, studied there under Ruistoop and afterward at the academies of Copenhagen (under Eckersberg) and Dresden He found subjects for his pictures in his wanderings on the Baltic coast, in the island of Rugen, and later among the Harz Mountains and the Riesengebirge, and became one of the principal exponents of Romanticism in painting His true place in art was first revealed in the German Centenary Exhibition at Berlin in 1906 In 1817 he was made a member of and professor at the Dresden Academy A series of drawings in sepia, depicting scenery in Rugen and other regions near the Baltic coast, is among his most highly prized works Prominent among his oil paintings are "View in the Harz" and "Moonrise by the Sea" (1823) in the National Gallery, Berlin, "Repose during Hay Harvest" (1835), in the Dresden Museum, 'The Grave of Arminius," in the Hamburg Gallery, "Pine Forest with the Raven," Castle Pulbus, Rugen

FRIEDRICH, WOLDEMAR (1846–1910) A German historical painter and illustrator, born at Gnadau, Province of Saxony He studied in Berlin under Steffeck and in Weimar under Plockhorst, Ramberg, and Verlat, took part in the Franco-German War of 1870–71 and furnished the illustrations for Hiltl's work on the war After a visit to Italy, in 1873, he returned to Weimar, where he was made professor at the School of Art in 1881 Called to Berlin in 1885 as instructor at the Academy, he was awarded the gold medal in 1886 for his allegorical ceiling-painting in the Exhibition Building Among several other decorative works on a large scale are to be especially noticed "The Diet of Worms" (1892), in the Aula of the Gymnasium at Wittenberg, and the two mural paintings, "Art and Science" and "Book-Trade and Printing," in the Booksellers' Exchange at Leipzig A series of landscapes and genre pictures in water colors and the illustrations to his work *Sechs Monate in Indien* (1893) were the fruits of a journey to India In 1889 he became a member of, and professor at, the Berlin Academy

FRIEDRICHSRUH, frē'drĭks-rōō A village and railway station of Lauenburg, Prussia, 16 miles southeast of Hamburg by rail Pop, 1900, 279 Its celebrity is derived from the proximity of the castle and estate of the Bismarck family, where Prince Bismarck (q v) died and is buried

FRIEND'LY ISLANDS See TONGA ISLANDS

FRIENDLY SOCIETY The name given to English benefit associations established as a rule by the workingmen themselves for certain forms of self-help, but now developed into mutual insurance societies The origin of the friendly society is frequently ascribed to the mediæval guild They began as sick clubs composed of small groups, usually neighbors, who met at the public houses, uniting conviviality with the payment of sick benefits and funeral expenses The large orders arose from the renewed interest of the eighteenth century in Freemasonry At first they had no regular benefit funds, but grants were made to members in distress After 1834, when the Poor Laws were changed and the opportunities for thrift were better, societies increased rapidly Since 1870 an effort has been made to put them on a stronger financial basis

In general the benefits given by friendly societies are for sickness and funeral allowances The question of superannuation funds is now important Other forms of benefit sometimes found are endowments, insurance for shipwrecks, loss or damage to boats, nets, tools, or implements, medical aid dispensaries, widows' and orphans' funds, convalescent homes, asylums for the aged, and traveling relief for those out of employment Formerly many local societies existed, but they are gradually disappearing A frequent form was the dividing society, which shared the surplus at the end of the year The strongly centralized societies have no social union, but only a business relationship with their members, as the dues are paid through agents or the post office

The members are usually clerks, tradesmen, or highly paid artisans There are two kinds of societies, not properly friendly societies (1) deposit societies with savings-bank features, and (2) burial societies—some merely local clubs, others large societies with many abuses, in which the cost of the management is 40 to 55 per cent, and which appeal to the poorest classes Many children are insured in them There are funeral and local factory and shop clubs for particular trades—often compulsory and subsidized by employers The large railroad and coal-mining societies provide principally for accidents The most important friendly societies are the affiliated orders, including the temperance societies and containing the pick of English workingmen and of the lower middle class The orders are democratic social centres, thoroughly educational in character. Societies for women have not been very successful The United Sisters' Friendly Society (1885), however, promises well Juvenile branches lately started have prospered

Many friendly society acts have been passed since 1783 The Act of 1875 is especially important Royal commissions have made valuable

reports (especially those of 1825–27 and 1870–74), showing the weaknesses due to small contributions, mismanagement, and competition These reports and permissive legislation, providing a legal status and supervision, have aided reform Many societies are still unregistered, and hence statistics are inaccurate In 1892 there were 29,742 societies, of which 24,598 gave in returns, comprising 8,320,262 members and funds amounting to £26,003,061 In 1904 the funds of the friendly societies were over £50,000,000 More comprehensive reports have been made under the Friendly Societies Act of 1896 as amended in 1908 Of the 31,469 societies reported in 1910, 29,425, with a membership of 14,507,000 and funds amounting to £62,866,000, submitted reports The Independent Order of Odd Fellows, Manchester Unity (1822), with about 750,000 members and an income of £1,500,000, and the Ancient Order of Foresters (1835), with 620,000 members and an income of £1,400,000, are the leading affiliated orders The Hearts of Oak Benefit Society and the Rational Aid and Burial Association are representative of the centralized associations Since 1870 the friendly societies have formed an association to watch legislation and protect their interests This has led to cooperation through medical aid associations and investment associations Scotland has many societies, they are a later growth in Ireland, several have been introduced into Australia, Canada, and the United States The friendly society has an important place in the development of the English workingman, but it does not reach equally all grades of the working class, especially the very poor and helpless Consult Baernreither, *English Associations of Working Men* (trans by Alice Taylor, London, 1893), Wilkinson, *The Friendly Society Movement* (ib, 1886), id, *Mutual Thrift* (ib, 1891), *Nineteenth Century*, 45, 891, Fuller, *The Law Relating to Friendly Societies* (3d ed, London, 1910) See BENEFIT SOCIETIES, FRATERNAL INSURANCE, OLD-AGE PENSIONS, POOR LAW

FRIEND OF MAN, THE A sarcastic popular title for Victor Riquetti, Marquis de Mirabeau, the father of the revolutionist It was suggested by the title of his work, *L'Ami des hommes*

FRIENDS, THE, or THE SOCIETY OF FRIENDS A denomination of Christians often known as Quakers, dating from about 1647 In spite of cruel and severe persecutions the Friends succeeded in establishing themselves in Europe and America They have never been numerically powerful, having at no time exceeded, if indeed they have ever reached, 200,000 members, but the purity of life which has so honorably distinguished them as a class has unquestionably exercised a salutary influence on the public at large, while in respect to certain great questions affecting the interests of mankind, such as *war*, *slavery*, and *oaths*, they have, beyond all doubt, originated or emphasized opinions and tendencies which are no longer confined to themselves, but have widely leavened the mind of Christendom

History. The founder of the Friends was George Fox (q v), who was born in Fenny Drayton, Leicestershire, England, 1624 He began to preach about 1647 and soon drew around him many who, like himself, were "dissatisfied with the teachings and practices of the day and were longing for a higher and more spiritual life" Neither Fox nor his adherents at first had any intention of establishing a new branch of the Church Such a result, however, was inevitable from the doctrines which they preached, for such were practically incompatible with the practices of the denominations then existing

For three or four years Fox's missionary labors were for the most part confined to the central part of England But in 1652 he came into Lancashire, to Swarthmoor Hall, near Ulverstone, the residence of Judge Fell and his wife, Margaret This able woman became one of Fox's strongest adherents and supporters From this neighborhood a band of 60 Quaker missionaries went forth to preach the doctrines of the new religious movement The continual travels of Fox, and the labors of this band of preachers, enforced by the simplicity, the truthfulness, and the spiritual power of their message, soon gathered thousands of adherents It is estimated that in London alone there were 10,000 It has often been said that these early preachers were ignorant men from the lower classes Such a statement is far from the truth, as among them were former Independent ministers, university graduates, officers of Cromwell's army, schoolmasters, and not a few persons of property

The doctrines held by the Friends, and their refusal to take any oath, to pay tithes, to obey laws deemed by them iniquitous, such as the "Conventicle Act" and the "Five-mile Act," brought them into constant conflict with the authorities During the 25 years of the reign of Charles II 13,562 were imprisoned in various parts of England, 198 were transported as slaves, and 338 died in prison or of wounds received in attacks upon their meetings It was not until after the revolution of 1688 that they were secure from serious molestation

The increase in numbers made necessary some kind of organization That adopted was almost wholly the work of Fox, and in its essential features is still preserved, as described below

After the time of persecution came a lull in the history of the denomination, and more attention was given to internal affairs than to missionary effort The "discipline" was administered rigidly, and the number of members diminished greatly during the eighteenth and first half of the nineteenth centuries Still as in America, great attention was paid to philanthropic work Later foreign and home mission work was actively entered into, the loss in membership was checked, and a new spirit of earnestness, which still continues, pervaded the body

The Quaker movement was not confined to England, it spread to Scotland, to Ireland, in some degree to the Continent, and in 1656 to America In that year Ann Austin and Mary Fisher arrived in Massachusetts They were cruelly treated, imprisoned, and then sent back to Barbados, whence they had come Similar harsh treatment meted out to others, or even the execution on Boston Common (1659–61) of three men and one woman (see BOSTON, DYER, MARY), did not deter Friends from visiting America In spite of persecution converts were made and meetings established in nearly all the English colonies George Fox himself traveled in America (1671–72)

Their numbers were relatively large, and the Friends exercised no little influence in Rhode Island, Long Island, New Jersey, and Maryland Perhaps the most important incident in their history, whether in the Old or New World, was

the settlement of Pennsylvania by William Penn in 1682, and the control of that Colony by the Friends for about 70 years See PENNSYLVANIA

Soon after the cessation of persecution the Friends withdrew from active aggressive movements and turned their attention to perfecting and administering their discipline, to the practice of philanthropy, notably to the extinction among their membership of the custom of holding slaves, and to labors in the general antislavery cause, also to caring for the American Indians, improving the condition of prisoners, the insane, etc The rigid application of the "Discipline," especially the "disowning" (depriving of membership) of those who had married nonmembers, was one of the chief causes of a steady decline in membership which increased in extent as the years went on The greatest blow to the Friends, however, was the "separation of 1827–28" This was a schism due to several causes The immediate occasion was the preaching and teaching of Elias Hicks (q v), a prominent Friend He promulgated doctrines closely approaching what are usually known as Unitarian views He also made statements which seemed to undervalue the Holy Scriptures and their divine authority More than one-half of the Friends in the Middle States followed Hicks, but they were largely in the minority as compared with the whole body of Friends The larger party was recognized by the London Yearly Meeting in England The two divisions are often called "Orthodox" and "Hicksite," and are so distinguished in the United States census reports Neither name is strictly accurate The smaller division prefer to be called the "Liberal Branch"

The effect of the schism upon the "Orthodox" body was to bring about a movement in favor of a higher education and a doctrinal belief more nearly allied to that of the so-called "evangelical" bodies The leader in this movement was Joseph John Gurney (q v), a highly educated and prominent Friend, of Norwich, England This new tendency, however, excited considerable opposition among some of the "orthodox" Friends in America, which resulted in another separation These separatists were called "Wilburites" from John Wilbur, of Massachusetts the leader of the movement The points of difference did not concern the essentials of Christianity, but rather their practical application, and also points of discipline and methods of administration This schism was not general, and the number of separatists were small

There remains still another body called the "Primitive Friends" They may be described as ultra-Wilburite They number less than 250 members

The Friends in Great Britain and Ireland do not differ in any important respects from their brethren in America Owing to the conscription laws which prevail on the continent of Europe, it has been almost impossible for the Friends to maintain meetings there In all, only about 250 members are found In Australasia there are about 500, and there are a few in Turkey and in Asia Bodies of considerable size of native converts to Christianity which are organized as Friends exist in India, China, and Japan

Doctrine It is perhaps more in the spirit than in the letter of their faith that the Friends differ from other orthodox Christians. This was so from the first The epistle addressed by George Fox and other Friends to the Governor of Barbados, in 1671, contains a confession of faith not differing materially from the fundamental doctrines of evangelical bodies The Friends have no formal creed or confession, and they have avoided the use of technical theological phraseology Declarations of faith, however, have been issued from time to time, notably in 1693, 1829, and 1887 In all of these the position taken on essential points of doctrine is substantially the same as that of the great bodies of Protestant Christianity

Their most distinguishing doctrine is that of the immediate personal teaching of the Holy Spirit to the individual This has often been called the "Inner Light," or the "Christ Within" This doctrine has often been misunderstood Some of the early Friends themselves are not clear in their statements regarding it George Fox unquestionably states the doctrine truly when he says, "I saw that the grace of God which brings salvation had appeared to all men, and that the manifestation of the Spirit was given to every man to profit withal" "The Lord opened to me," he says in another place, "how every man was enlightened by the divine light of Christ" Robert Barclay in the *Apology* taught that even the heathen were illumined by this light, though they might not know—as, indeed, those who lived before Christ *could* not know—the historical Jesus in whom Christians believe In consequence of this view the Friends held that every one who lived up to the light which he had would be accepted of God This fact, however, in no wise relieved the individual from the duty of seeking to obtain more light, neither did it relieve those who had the gospel from the duty of carrying it to those who had it not The early Friends were among the most active Protestant missionaries of their day The doctrine of the direct manifestation of the Holy Spirit to the individual lies at the root of most of their special doctrines It is the Holy Spirit who calls and qualifies for religious service, therefore *all* believers are "priests unto God," and there is no division into clergy and laity

The early Friends accepted the usual view of the Bible that it was a divinely inspired volume Because, however, they exalted the direct teaching of God, it was sometimes charged that they depreciated the historic record There does not seem to be much basis for this charge Later in some sections a more easy view of inspiration has obtained, made possible by increasing emphasis upon the exclusive authority of the "Christ Within"

Practice. It follows from the doctrine that the Holy Spirit calls and qualifies whom He will for religious service, that the Friends do not consider human learning a necessary qualification for the minister of the gospel They believe that the call to this work now, as of old, is "not of men, neither by man," and that it is bestowed irrespectively of rank, talent, learning, or sex Consequently they have no theological schools or professors of divinity At the same time education is not undervalued, and provision is made in nearly all their colleges and higher schools for instruction in Church history, biblical languages, and allied subjects, but above all in the Bible itself These courses are, however, not restricted to any class, but are open to all

As fitness for the ministry is held to be a free gift of God through the Holy Spirit, so it ought to be freely bestowed upon others But, on the other hand, whenever ministers are engaged from home in the work of the ministry they are, in the spirit of Christian love, freely entertained and have all their wants, including traveling expenses, supplied Of recent years, in some places and under some circumstances, a minister receives partial or even whole support, but neither by minister nor by congregation is the ministry put upon a pecuniary basis In some cases "secretaries" have of late been appointed, who are expected to exercise pastoral care and attend to the various organizations of the church These may or may not be ministers

Their mode of conducting public worship likewise illustrates their dependence on the guidance of the Holy Spirit The Friends meet and usually remain in silence until some one believes that he is called upon by the Spirit to speak in exhortation, praise, prayer, testimony, instruction, or the ministry It follows from this that there may be several communications of different kinds in the same meeting, and the exercise may be from old or young, male or female, from those who are recorded ministers or from those who are not While this theory of the meeting for worship is still realized in England and in many of the Eastern States of the United States, in the West the form more nearly approaches that of other religious bodies, with a prearranged programme and a prepared sermon

Friends reject the ordinances of baptism and the eucharist as these are observed by other Christians They believe that the true Christian baptism is a spiritual one and not one with water They believe that the true communion is inward and spiritual and consists, not in any symbolic breaking of bread and drinking of wine, but in that daily communion with Christ through the Holy Spirit and through the obedience of faith by which the believer is nourished and strengthened They believe that Christ did not command *any* outward ordinance as of perpetual observance, that if the true spiritual baptism is experienced and the true spiritual communion is partaken of, there is no need of any symbol They believe, moreover, that the symbol tends to call attention away from the essential and beget a reliance upon the outward and nonessential

The taking and administering of oaths is regarded by the Friends as inconsistent with the words of Christ, "swear not at all," and with the injunction of the Apostle James, "Above all things, my brethren, swear not, neither by heaven, neither by the earth, neither by any other oath, but let your yea be yea, and your nay, nay, lest ye fall into condemnation" They have also refused to contribute to the support of a state church

The Friends have likewise consistently protested against war in all its forms, and they have repeatedly advised their members against in any way aiding or abetting military affairs In support of this belief the Friends have at various times suffered much in person and property They regard the profession of arms and fighting as diametrically opposed to the general spirit of Christ

The Friends may certainly claim to have cultivated the moral sense of their fellow countrymen in regard to the emancipation of the slaves and the abolition of the slave trade As early as 1688 the Friends of Germantown, Pa, made a written protest against slavery The feeling that slavery was wrong continued to grow, through the labors of John Woolman, Anthony Benezet, and others the feeling became a conviction of the body, and by the close of the eighteenth century slavery was banished from the Friends

Discipline By the term "discipline" the Friends understood "all those arrangements and regulations which are instituted for the civil and religious benefit of a Christian church" The necessity for such discipline made itself felt soon after the rise of the body, and the result was the gradual establishment of certain meetings or assemblies These are four in number first, the *preparative* meetings, second, the *monthly* meetings, third, the *quarterly* meetings, and fourth, the *yearly* meetings Preparative meetings are wholly subordinate to the monthly meetings, they have little power, they attend exclusively to local matters, and where they exist must report to monthly meetings The decided tendency in America is to give them up, and in the new Uniform Discipline they are discontinued The monthly meeting is the executive power, so far as the membership is concerned, subject to appeal to the quarterly and yearly meetings It decides in cases of violation of the discipline and has the power to receive into membership or to disown It attends to all cases of immoral conduct, cares for the poor, and encourages the right exercise of the gifts of the members The quarterly meetings are composed of several monthly meetings and exercise a general supervision over the latter, from which they receive reports, and to which they give such advice and decisions as they think right The quarterly meetings send representatives to the yearly meeting The term "yearly meeting" is used in two senses first, the body of members who live within certain defined geographical limits, of this use mention will be made later on under the head *Statistics*, second, the annual assembly or conference, consisting primarily of representatives from the quarterly meetings, but every member has the right to take part in the deliberations and conclusions of the assembly The function of the yearly meeting is to consider the condition of its membership in all its aspects To it exclusively the legislative power belongs, and from its decisions there is no appeal As its name implies, it is held but once a year, but in order that the interests of the body might not suffer between its sessions, a meeting was instituted first called the "Meeting for Sufferings," because its chief business was to take cognizance of the sufferings of Friends for conscience' sake, then, the "Representative Meeting", and still later the "Permanent Board" This body has stated times of assembling, but can, if necessary, be called together at short notice

The officers of the organization are (1) *overseers*, appointed by each monthly meeting for a term of three years, they are two or more in number, usually equally divided between the sexes, and their duties are the oversight and watchful care of the membership, (2) *elders*, two or more in number, of both sexes, appointed by monthly meetings with the approval of the quarterly meeting, they now usually hold office for three years, their chief duty is to exercise care over the ministry, (3) *ministers*, as al-

ready implied, the Friends do not appoint ministers, but "record" those upon whom they believe the gift is conferred through the Holy Spirit

There is no doubt that a great change has come over the Friends This is noticeable in externals rather than in doctrine Any distinctive garb has been laid aside by almost all members, the use of the "plain language"—"the thee and thou of the Quakers"—also, except familiarly among themselves, has been practically dropped, and the numerical names of the days and months are used only in official statements and among themselves It is true some exception to these statements must be made more particularly in regard to the "Wilburites" and the Friends in Philadelphia Yearly Meeting, but even in the latter the tendency is towards disuse The discipline is administered in accordance with the spirit rather than the letter, and there is a general falling away from formalism In many of the meetings of the Middle West and West there are "pastors" whose duty is pastoral visitation and the care of the meetings for worship, where the whole time of the "pastor" is given to such work a very moderate support is generally afforded

The Friends are an active missionary body, and foreign missions are supported at various points in Madagascar, India, China, Japan, Africa, Mexico, Cuba, and Jamaica, and among the Indians of the United States and Alaska There is an American Friends' Board of Foreign Missions, whose duty is to have a general oversight, but not control, of the foreign missionary field Great efforts have been made to bring about a closer union of the various yearly meetings, for they are now independent This is shown by general conferences held at various times, and since 1887 every five years From these conferences the plan of a regular meeting with defined powers to be held every five years has been adopted This Five Years' Meeting, as it is called, is composed of delegates from all the yearly meetings uniting in the plan, the first meeting was held in October, 1902, at Indianapolis, Ind Besides this a "Discipline" for all the American yearly meetings has been drawn up and has already been adopted by a majority and probably will be adopted by all except one or two yearly meetings This Discipline and the Five Years' Meeting form the basis of a union which somewhat resembles that of the United States under the Articles of Confederation It is too soon to forecast what the result of these efforts will be All these remarks apply only to the "Orthodox" body

In England a most significant movement is the establishment of an "Adult School"—a movement originated and still largely managed by Friends This now embraces some 100,000 adherents, mostly of the working classes.

A pleasant feature of recent date is the tendency for all branches of Friends to meet in conference to consider questions like peace, temperance, and social work, upon which they can unite on common grounds The "Hicksites" have not entered into the foreign mission field, but have been active in philanthropic efforts of various kinds, and the different yearly meetings have found a close bond of union in association for this philanthropic work.

The subject of education has claimed the earnest attention of both "Orthodox" and "Hicksite" bodies The former, besides a number of boarding schools, have, for higher education, Haverford College, Haverford, Pa , Guilford College, N C , Wilmington College, Wilmington, Ohio, Earlham College, Richmond, Ind , Penn College, Oskaloosa, Iowa, Friends' University, Wichita, Kans , Whittier College, Whittier, Cal , Pacific College, Newberg, Oreg Bryn Mawr College for Women, Bryn Mawr, Pa , though controlled by Friends, is undenominational The "Hicksite" body has excellent schools, and Swarthmore College, for both sexes, at Swarthmore, Pa During the past few years general summer schools for the study of religious history and biblical literature have been held at Haverford, Earlham, and Swarthmore colleges, and elsewhere, besides other summer schools of more limited extent

Statistics The "Orthodox" have 16 yearly meetings, viz , London (for Great Britain), Dublin, Canada, New England, New York, Philadelphia, Baltimore, North Carolina, Ohio, Wilmington (for southern Ohio and Tennessee), Indiana, Western (Indiana), Iowa, Kansas, California, and Oregon, there are also the small communities scattered throughout the world, as already noted The "Hicksites" have seven yearly meetings—New York, Genesee (western New York), Philadelphia, Baltimore, Ohio, Indiana, and Illinois The "Wilburites" have six—New England, Canada, Ohio, Western (Indiana), Iowa, and Kansas In 1913 the "Orthodox" in America numbered 99,308 members, in Great Britain, Australia, and Ireland, 22,350, total, 121,658 The "Hicksites" had about 19,000 members, the "Wilburites" 4000, the "Primitive" branch 200, total, for all bodies, 144,858

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FRIEND'SHIP IN FASHION A comedy by Thomas Otway

FRIENDS OF GOD (Ger *Gottesfreunde*) A small body of religious reformers of mystical tendencies, which originated in the fourteenth century and labored for the reformation of the Church and society, continuing their adherence to the former The name was derived from John xv 15 Tauler (q v), the great Dominican mystic of Strassburg, and Heinrich Suso (q v) were of the brotherhood, and Meister Eckhart (q v) sympathized with it, although probably

not belonging to it It also included many Dominican nuns The brotherhood is heard of in Basel, Strassburg, and Cologne, but probably had members elsewhere Sympathizing to some extent with the Brothers of the Free Spirit, they nevertheless avoided the fanaticism ascribed to that body (See BROTHERS AND SISTERS OF THE FREE SPIRIT) Consult Jundt, *Les amis de Dieu au quatorzieme siecle* (Paris, 1879), Rieder, *Der Gottesfreund vom Oberland* (Innsbruck, 1905), Jones, *Studies in Mystical Religion* (New York, 1909)

FRIENDS OF THE PEOPLE An English society founded in 1792 by Sheridan and Grey for the purpose of promoting parliamentary reform Among its members were Lord John Russell and Lord Edward Fitzgerald It was opposed by Fox and Pitt The reform bills brought forward by Grey in 1792, 1793, and 1797 received scarcely any support In fact, during the struggle with Napoleon the times were not favorable to any constitutional change, and so the association languished, serving mainly as a school in which were trained the great leaders who 40 years later saw its original purpose accomplished in the Reform Bill of 1832

FRIENDS OF THE TEMPLE (Ger *Tempelgesellschaft, Tempelverein, Jerusalemsfreunde*) A German sect, called also the TEMPLE SOCIETY and HOFFMANNITES, who, accepting the Scriptures in full, expect the fulfillment of all the prophecies and believe it the duty of Christ's disciples to labor to promote that end, as Christ Himself came to do The first step is to gather the people of God in Palestine, and with this idea spiritual communities called Temples are instituted in different countries, to assist in the construction of the Temple in the Holy Land The society originated in Wurttemberg towards the middle of the nineteenth century under the lead of the Rev Christopher Hoffmann In 1868 a colony was established at Jaffa, the following year one at Haifa, and others have been added at Sarona, near Jaffa, at Jerusalem and at other places in Palestine The doctrines of the Friends of the Temple have not been formulated into a creed The spiritual development of the members is a matter to which careful attention is given The rite of baptism and the Lord's Supper are observed, but are not under definite regulation, individual convictions being allowed to prevail in the choice of the method The religious aspects of the movement have declined from Hoffmann's death in 1885, and its importance to-day is chiefly on the economic side and in its support of German interests in the East There is a community in Wurttemberg, one in Alexandria, Egypt, and one in the United States, with about 350 members There are about 1500 colonists in the East Consult Hoffmann, *Occident und Orient* (Stuttgart, 1875), id, *Mein Weg nach Jerusalem* (ib, 1881–85), Kalb, *Kirchen und Sekten der Gegenwart* (1907)

FRIES, frēs, ADRIAEN DE See VRIES

FRIES, BERNHARD (1820–79) A German landscape painter, born at Heidelberg He studied at Karlsruhe under Koopman and at Munich, where he was influenced by Rottmann, and later in Geneva under Calame He traveled in France and Austria and remained eight years in Italy His best works are a cyclus of 40 Italian views He was forced to sell them separately, two are in the vestibule of the Technical High School in Munich They are poetically conceived and carefully painted Other landscapes are in the Munich Pinakothek, the Schack Gallery, Munich, and the Stuttgart Museum —His brother ERNST (1801–33) was born at Heidelberg He was a pupil of K Kuntz at Karlsruhe and afterward studied in Munich, Heidelberg, and in Italy On his return he lived in Munich and Karlsruhe Despite his short life, Fries left some excellent pictures, such as "A View of Tivoli," "The Waterfall of Liris at Isola di Sora" (Munich Pinakothek), "Landscape in the Sabine Mountains" (Leipzig Museum), and "A View of Heidelberg" (National Gallery, Berlin) The works show a sincere feeling for nature

FRIES, ELIAS MAGNUS (1794–1878) An eminent Swedish botanist He was born in the parish of Femsjo and studied at the University of Lund, where he became demonstrator in botany in 1828 In 1834 he went to the University of Upsala as professor of economic science, to which chair after the death of Professor Wahlenberg, in 1851, was united the chair of botany In the latter year he was also appointed director of the Upsala Botanic Garden, and in 1859 he retired from active work Fries made important contributions to all departments of systematic botany, but especially to the knowledge of lichens, fungi, and mosses, upon which groups of plants he wrote many important works Some of his publications are *Systema Mycologicum* (3 vols, 1820–32), *Elenchus Fungorum* (2 vols, 1825), *Lichenographia Europæa Reformata* (1831), *Flora Scanica* (1835), *Sind die Naturwissenschaften ein Bildungsmittel?* (1844), *Summa Vegetabilium Scandinaviæ* (2 vols, 1846–49), *Novæ Symbolæ Mycologicæ* (1851), *Monographia Hymenomycetum Sueciæ* (2 vols, 1857–63), *Epicrisis Generum Hieraciorum* (1862); *Sveriges atliga och giftiga svampar, Fungi Esculenti et Venenati Scandinaviæ* (1862–69), with 93 colored plates, *Botaniska utflygter*, three volumes of collected short papers (1843–64)

FRIES, JAKOB FRIEDRICH (1773–1843) A German philosopher, born at Barby, Saxony He studied there and in the universities of Leipzig and Jena and became a lecturer in philosophy at the latter in 1801 From 1806 to 1816 he was professor of philosophy and elementary mathematics at Heidelberg, and from 1816 until his death professor of theoretical philosophy at Jena His chief work is the *Neue Kritik der Vernunft* (3 vols, 1807), an attempt to find a new basis for the critical philosophy of Kant His method is psychological He holds that a knowledge of the a priori cognition of Kant is to be attained only by the a posteriori process of subjective experience Hence, the a priori element, inasmuch as it is discoverable only by subjective experience, is not, as Kant contends, transcendental to all experience Therefore philosophy finds its ultimate foundation in subjective knowledge and its true exposition through psychological analysis Other differences from the Kantian teaching are also encountered in Fries, whose work, though ingenious, may be said to contribute little to the progress of speculation

FRIES, JOHN (c 1764–1825) The leader of the so-called "Fries Rebellion" in Pennsylvania in 1799 He was the son of a Pennsylvania farmer and was successively a cooper's apprentice, a soldier (during the Whisky Insurrection), and an auctioneer In July, 1798, Congress voted a direct tax of $2,000,000, $237,000 of which was fixed upon, in January, 1799, as

Pennsylvania's quota Soon afterward Federal officers began to make the assessments In Pennsylvania the tax fell chiefly on houses and lands, the value of the former being determined by the number and size of the windows Among the Germans in the counties of Montgomery, Lehigh, Bucks, and Berks, a regular opposition, under the leadership of Fries, was organized to the assessment of what they considered a "window tax" This led to open conflict with the Federal officers, and at Bethlehem, on March 7, a considerable force of disaffected farmers and some militia under Fries compelled the United States marshal to liberate 30 prisoners who had been arrested for opposing the law Finally the militia was called out by President Adams, and many of the rioters, including Fries, were captured and taken to Philadelphia Here Fries was twice tried for treason, and was each time found guilty and sentenced to death, but was eventually (April, 1800) pardoned by President Adams, who at about the same time issued a general amnesty to all who had been concerned in the uprising Afterward Fries settled in Philadelphia and acquired a considerable fortune in the tinware trade Consult Davis, *The Fries Rebellion* (Doylestown, Pa, 1899), McMaster, *History of the People of the United States*, vol ii (New York, 1907), and, for an account of the trial, *Das erste und zweite Verhor von John Fries* (Allentown, Pa, 1839)

FRIESE, frē'ze, RICHARD (1854–) A German animal and landscape painter, born at Gumbinnen, East Prussia He studied at the Academy in Berlin After traveling in the East in Norway, and as far as the polar regions, he rapidly acquired his present reputation as one of the best animal painters in Germany He is especially noted for his vivid delineations of the lion's life in the desert and also of the native deer world in the German forest The landscape portion of his pictures is especially good He became a member of the Berlin Academy in 1892 and professor in 1896 His works include "Lions Surprising Caravan's Camp" (1884), Dresden Gallery, "Elks on Field of Battle" (1890), National Gallery, Berlin, "In the Bredszell Moor" (1895), Konigsberg Museum, "A Twenty-pronged Stag under Way," owned by Emperor William II

FRIESEKE, frē'ze-kĕ, FREDERICK CARL (1874–) An American genre painter, born at Owosso, Mich He studied at the Art Institute, Chicago, the Art Students' League, New York, and under Constant, Laurens, and Whistler at Paris After his twenty-fifth year he lived in France, spending much of his time at Giverny in Eure, the residence of Claude Monet He is a decided Impressionist, yet does not seem to have been influenced by any master of the group except Renoir His subjects are usually female figures in bright-colored interiors or in his beautiful garden The nude has played a considerable part in Frieseke's work, as, e g, in his picture in the Luxembourg Gallery (Paris), "Before the Mirror" He made frequent and successful trips to America, painting decorations and contributing to various exhibitions The first individual exhibition of his work in New York was held in 1912 He received numerous awards, including gold medals at Munich (1904) and Philadelphia (1913), was elected an associate of the National Academy and the Société Nationale des Beaux-Arts, and is represented in the galleries of Vienna, Odessa, Venice, Savannah, and other cities The Metropolitan Museum, New York, possesses "The Toilet", the Art Institute, Chicago, "The Open Window"

FRIESEN, frē'zen, HERMANN, BARON (1802–82) A German Shakespearean scholar He was educated at Leipzig and Gottingen and occupied several positions at the court of Saxony He became known for his *Briefe uber Shakespeares Hamlet* (1864) and *Shakespeare-Studien* (1874–76) He also made valuable contributions to the *Jahrbuch* of the German Shakespeare Society

FRIESEN, KARL FRIEDRICH (1785–1814) A German patriot He was born at Magdeburg, studied at the Academy of Architecture, Berlin, collaborated on the great atlas of Mexico edited by Humboldt, and in 1810 became an instructor in the Plamann Institute In 1810–12 he rendered important services to Jahn in the establishment of German gymnastics Upon the outbreak of the German War of Liberation, in 1813, he assisted in organizing the volunteer corps of Major von Lutzow, whose adjutant he became After the dispersion of the corps by Napoleon at Rheims he was captured and shot by the French at La Lobbe, Ardennes, March 15, 1814 In 1843 his body was buried in the military cemetery at Berlin He has frequently been celebrated by German writers, in particular by E M Arndt in "Es thront am Elbestrande" Consult the life by Euler (2d ed, Berlin, 1899)

FRIESEN, RICHARD, FREIHERR VON (1808–84) A statesman of Saxony He was born at Thurmsdorf, Saxony, was educated at Gottingen and Leipzig, entered the civil service of Saxony, and was Minister of the Interior from 1849 to 1852, resigning because he did not agree with Von Beust on tariff questions In 1858 he became Minister of Finance and in 1867 of Foreign Affairs also He was appointed in 1870 a commissioner to arrange in Versailles treaties with the South German states looking to the unification of Germany From 1871 until his retirement in 1876 he was president of the ministry Consult his *Erinnerungen aus meinem Leben* (Dresden, 1880), and Beust's reply, *Erinnerungen zu Erinnerungen* (Leipzig, 1881)

FRIESIAN, or **HOLSTEIN-FRIESIAN, CATTLE** See *Dairy Cattle*, under CATTLE

FRIESIAN ISLANDS See AMRUM, TERSCHELLING, TEXEL

FRIESLAND, or **VRIESLAND**, frēz'land (Lat *Frisia*) A northwestern province of the Netherlands, bounded by the North Sea, Zuyder Zee, and the provinces of Groningen, Drenthe, and Overyssel (Map Netherlands, D 1) Area (including the islands of Ameland and Schiermonnikoog), 1282 square miles The land is flat and in some parts of the northeast below the level of the sea, but very gradually ascends towards the southeast It is walled up by numerous dikes and sluices Streams are few, but there are numerous canals and lakes abounding in fish About 60 per cent of the area being composed of meadows and heath, Friesland is better adapted to pastoral than purely agricultural industries It breeds excellent horses and other domestic animals, which, with dairy products, are the chief exports On the higher ground industry is confined to peat digging The manufacturing industries are comparatively insignificant The capital is Leeuwarden (q v) Pop, 1905, 356,017, 1912, 366,305

FRIETCH'IE, BARBARA See BARBARA FRIETCHIE

FRIEZE, frēz (OF *frise, frize*, Fr *frise*, OIt *frigio, friso, fregio*, It *fregio*, probably from ML *phrygium, frisium*, embroidered work, from Lat *Phrygius*, Gk Φρύγιος, *Phrygios*, Phrygian, from Φρύξ, *Phryx*, Phrygian, otherwise connected with OF *friser, frizer*, Fr *friser*, OFries *frisle, fresle*, hair of the head) In architecture, a horizontal band, plain or decorated, especially in classic and neoclassic styles, the middle member of an entablature (q v) In the Doric order (see ORDERS OF ARCHITECTURE) the frieze is divided into square panels, called *metopes* (q v), by the vertically grooved triglyphs In the other orders the frieze is either plain or adorned with relief sculpture of figures (whence the Vitruvian name *zoophorus*, 'bearer of living forms') or ornament The celebrated frieze of the Parthenon, with its relief of the Panathenaic procession, surrounded the cella wall at the top immediately under the pteroma ceiling Other famous Greek friezes were those of the choragic monument of Lysicrates, the mausoleum of Halicarnassus, the Xanthus tomb, the Treasury building at Delphi, the temple of Nike Apteros at Athens, that of the temple of Apollo at Phigaleia and of the temple and altar at Pergamon The Romans adorned their friezes with rich carving of ornament and of symbolic forms, rarely with figure reliefs The Renaissance revived the Roman practice and developed also splendid forms of painted frieze decoration. Modern art has followed both the Greek and the Roman system, but without as yet producing any consummate example

FRIEZE, HENRY SIMMONS (1817–89) An American scholar and writer, born in Boston, Mass After 1830 he was a clerk and organist He graduated at Brown University in 1841, until 1845 taught there, and then until 1854 in the grammar school of the university He then left Brown to accept the professorship of Latin at the University of Michigan, a position which he held until his death From 1869 to 1871 he was acting president of the university, during this period most of the academic privileges were thrown open to women Frieze devised a system of inspection which established an official connection between the university and the high schools of the State In the year 1880–81 he was again acting president He edited Vergil's *Æneid* and books x and xii of the *Institutes* of Quintilian, delivered and published addresses on *Ancient and Modern Education* and *Art Museums*, and presented valuable reports to the Michigan State Board of Regents His last work was *The Story of Giovanni Dupré* (1886)

FRIG'ATE (from OF *fregate*, possibly from Lat *fabricata*, sc *navis*, ship, p p of *fabricari*, to build, from *fabrica*, workshop, from *faber*, artisan) A warship of a type now long obsolete The term was used in the Mediterranean in the fourteenth and fifteenth centuries—and perhaps for many centuries before—to designate a narrow, fast-sailing vessel, fitted also to be propelled by oars, and having holes in the sides for the passage of the latter resembling gun ports These vessels were small and were used for ordinary purposes of traffic and not for war Their shape and speed caused the model to be followed for larger craft adapted for heavy weather in the open sea In the sixteenth century the term was very generally applied to merchant ships in all the countries of western Europe Towards the close of the century certain of these merchant frigates were hired for service in the English navy, but they appear to have been quite small craft The first frigate built in England was the *Constant Warwick*, built at Ratcliffe by Peter Pett the elder, as a privateer for the Earl of Warwick, and afterward purchased by the government The model was taken from a French frigate, according to the Earl's son, but Pett, or his friends, claimed that he was the inventor of the frigate The *Constant Warwick* carried 26 guns as a privateer, but the battery was gradually increased to 42 guns in 1677 The distinguishing characteristics of frigates grew to be speed and handiness combined with moderate size The type began to crystallize during the seventeenth century, and soon after the middle of the eighteenth it was well established Frigates were then rated as forty-fours, thirty-eights, thirty-sixes, thirty-twos, twenty eights, and twenty-fours, according to the number of guns carried Ships carrying less than 32 guns were rarely frigate-built, and it was common for frigates to carry several guns more than implied in their rating, particularly after the introduction of carronades (See CARRONADE) At the beginning of the nineteenth century a frigate was a vessel carrying guns on one covered deck and on an uncovered deck above this. If these were all long guns, the gun-deck (lower) battery consisted of 26 to 32 long 18-pounders or 12-pounders, and the spar-deck battery of six to twelve 6, 9, or 12 pounders The rig was that of a ship, three masts, square-rigged on all The tonnage—a rather uncertain measure of size—of the British frigates varied between 500 and 1200, some of the United States navy were larger (See CONSTITUTION, also, section on *Navy* in article UNITED STATES) After the application of steam to war vessels the term "frigate" steadily lost significance and is now no longer used, except in some European navies, where *captain of frigate* is a title of rank of naval officers answering to that of commander in the United States navy Consult G C V Holmes, *Ancient and Modern Ships* (2 vols, London, 1906), and E K Chatterton, *Ships and Ways of Other Days* (Philadelphia, 1913)

FRIGATE BIRD (so called from their attacks on other sea birds), or MAN-OF-WAR HAWK A sea bird (*Fregata aquila*) of the order Steganopodes, related to the pelicans, and hence sometimes called "frigate pelican" It is a large bird, with black plumage, sometimes measuring 10 feet from tip to tip of its extended wings, and is capable of very powerful and rapid flight It inhabits the intertropical coasts, both of the Atlantic and Pacific oceans, often flying far out to sea, but most of the time remaining near shore Its aerial evolutions are extremely graceful, and it soars to a great elevation It is said never to dive for its prey, but to seize fishes only when they appear at the surface or above it, and flying fishes constitute no small part of its food It also pursues gulls and terns and eats the fish which it forces them to disgorge The feet are very small, but the bill is 5 inches long and strongly hooked at the tip A closely allied species (*Fregata minor*) is found in the Pacific and Indian oceans, and the two with perhaps a third comprise the whole genus, which is the only one in the family Fregatidæ. These birds breed in companies on the ledges of sea cliffs, on trees near shore, or on the ground of oceanic islets, making a very rude nest and laying a single white egg In the breeding

season the gular pouch of the male becomes a vivid scarlet and is greatly distended, so that these birds form very striking objects as they roost upon the ground or wheel about in the throng of the colonies The interior of the pouch is in communication with the air sacs of the neck and is filled or emptied (slowly) through the bronchi When full, it is a semi-transparent balloon and reaches forward as far as the end of the beak and downward so as completely to hide the breast When empty, it retracts to invisibility between the rami of the lower mandible Consult Bennett, *Gatherings of a Naturalist in Australia* (London, 1860); Mosley, *A Naturalist on the Challenger* (ib, 1879), Buller, *Birds of New Zealand* (2d ed, ib, 1888), Forbes, *Wanderings in the Eastern Archipelago* (New York, 1885), Leiter, account of nesting of frigate birds on Phœnix Island, South Pacific Ocean, in *Proceedings of the Zoological Society of London* (London, 1891), Chapman, *Papers from the Tortugas Laboratory, Carnegie Institution Publication No 103* (Washington, 1908) See TROPIC BIRD, and also Plate of FISHING BIRDS

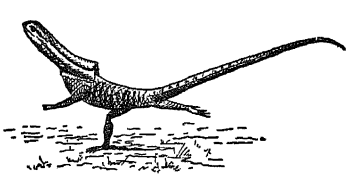
FRIGATE MACKEREL. A species of mackerel (*Auxis thazard*), abounding in all warm seas, sometimes in immense schools, but of little value See MACKEREL

FRIGGA, frĕg'ga See FREYJA AND FRIGGA.

FRIGIDARIUM See BATH, *Rome*

FRILL BACK A domestic pigeon of an East Indian breed, whose feathers are wholly turned forward The beak is very short

FRILLED LIZ'ARD A large agamoid lizard (*Chlamydosaurus kingi*) of the tropical parts of Australia, remarkable for its erectile ruff and for its running on two legs only Its habits are sylvan, and its chief resort is the trunk or lower limbs of a tree It subsists on beetles almost exclusively, all captured alive and in daylight At night it rests clinging to the bark in an upright position Its ordinary attitude is with the hind legs spread and flexed, letting the vent and tail rest upon the ground, while the fore part of the body, with the head uplifted, is supported high upon the stiffened forearms When this lizard runs, however, it holds the fore part of the body clear of the ground and goes upon the hind legs alone, after the manner of a bird This feature, and its bearing upon the animal's ancient avine and



A FRILLED LIZARD, RUNNING

lacertilian relationships, are discussed by Professor Saville-Kent in the *Proceedings of the Zoological Society of London* for 1895, pp 712–717 The same specialist describes, from a study of captive examples, the skin membrane about the neck as a denticulated frill, which in old lizards may measure 8 or 9 inches in diameter It may be erected or depressed at will, but as slender processes of the hyoid bone extend into it, the membrane cannot be expanded unless the mouth is open, nor can the opening of the jaws fail to lift the bill, which is otherwise folded inconspicuously upon the neck (See LIZARD) It is dun-colored on the outside, like the rest of the body, but its inside, brought to view when erected, is brilliant with red and yellow mottlings, as also are the parts of the head otherwise concealed Its function, evidently, is to act as a "scare" organ The sudden expansion of this gaudy disk in the face of an enemy, with the wide-open, sharply hissing mouth in the centre, followed, as a rule, by an instantaneous rush forward, is calculated to terrify the foe completely In addition to this harmless demonstration the long, whiplike tail is vigorously lashed from side to side, and able to inflict sharp blows likely to be both disconcerting and painful Cf JEW LIZARD, and consult Saville-Kent, *The Naturalist in Australia* (London, 1897) See Plate of LIZARDS

FRIMAIRE, frē'mâr' (Fr, sleety) The third month in the French Republican Calendar of 1793 It began on November 21 in years 1 to 3 and 5 to 7, on November 22 in years 4, 8 to 11, 13, and 14, and on November 23 in year 12

FRIMONT, frē'mŏng', JOHANN MARIA PHILIPP, COUNT, PRINCE OF ANTRODOCCO (1759–1831) An Austrian general, born at Finstingen, Lorraine He studied at the Collège at Pont-à-Mousson, entered the Austrian army in 1776, fought against Napoleon, notably at Marengo, and commanded a cavalry division under Prince Schwarzenberg in Russia in 1812 In 1815, with the rank of general of cavalry, he was in command of the Austrian forces in northern Italy and subsequently of the army of occupation in France He was appointed in 1821 to the chief command of the army sent to restore order at Naples and suppress the Carbonari, and for his services received the Italian title of Prince of Antrodocco and 220,000 ducats In 1831 he suppressed a rising in Modena a short time before his death

FRINGES (dialectic Fr *frinche*, ML *fringia*, OF, Fr *frange*, probably from Lat *fimbria*, border, fringe) In optics, the alternate bands of light and dark, due to the interference of waves of light, which are produced when a beam passes the sharp edge of a screen, or is transmitted through a narrow slit or hole, or biprism, or by reflection from a Fresnel mirror, are called fringes See DIFFRACTION AND DIFFRACTION GRATINGS, INTERFERENCE, LIGHT

FRINGES In the English Bible, the translation of the Hebrew *gedilim* in Deut xxii 12, and of *sisith* in Num xv 38 The marginal reading of the Revised Version, "twisted threads" and "tassels," is probably better In the passage in Deuteronomy the Hebrews are commanded to place fringes upon the four corners of their robes, in Numbers, in a later passage, the description is more detailed, and the reason is assigned "to remember all the commandments of the Lord" The injunction was much elaborated by the rabbis and made a matter of the first importance in Judaism (cf Matt xxiii 5) Originally the garment to which the fringes were attached was the outer one, passages in the Gospels in which it is stated that the healing power of Jesus was experienced if the hem or border of His garment were touched doubtless refer to the fringes or tassel (Matt ix 20, xiv. 36, Mark vi 56, Luke viii 44) In the course of time, because of persecution, the fringes came to be concealed and are now put by orthodox Jews on a separate garment worn under the outer, reaching only to the chest, and

called the smaller *tallith*, to distinguish it from the larger *tallith*, which also has fringes and is worn only during the recital of the prayers In form it is a modern survival of the ancient dress of the Jews The wearing of fringes is doubtless based on some ancient custom of a religious character, possibly they were regarded as amulets Consult Robertson Smith, *Religion of the Semites* (London, 1894), Nowack, *Hebraische Archaologie* (Freiburg, 1894), Benzinger, *Hebraische Archaologie* (2d ed, Tubingen, 1907)

FRINGE TREE (*Chionanthus*) A genus of plants of the family Oleaceæ, comprising about three species of small trees or large shrubs, natives of America and China The common fringe tree, or snowflower (*Chionanthus virginica*), is found in the United States from Pennsylvania and Delaware to the Gulf of Mexico and west to Texas It sometimes attains the height of 20 or 30 feet, but is rarely more than 8 or 10 feet high; has opposite oval leaves 6 or 7 inches long, and very numerous snow-white flowers in

FRINGE TREE

panicled racemes The limb of the corolla is divided into four, sometimes five or six, linear segments an inch or more long, whence the name "fringe tree" The fruit is an oval drupe The tree is frequently cultivated as an ornamental plant

FRINGIL'LIDÆ (Neo-Lat nom pl, from Lat *fringilla*, a sort of small bird, probably the chaffinch) A family of typical passerine birds, having a conical or nearly conical bill, sometimes short and thick, sometimes comparatively slender and elongated, sometimes convex above, below, or at the sides, the commissure—line of junction of the mandibles—straight The neck is short, and neither the tail nor the wings are long The Fringillidæ are all small birds and feed chiefly on seeds, but to some extent also on insects The family is an extremely numerous one and is distributed over all parts of the world. It is represented in America by finches, sparrows, grosbeaks, crossbills, etc, elsewhere described, and has by some systemists been placed at the head of the list of all birds, being regarded as the most highly organized group (See FINCH) Typical forms are illustrated in the Plates FAMILIAR SPARROWS, in the article SPARROW, BUNTINGS AND GROSBEAKS, CAGE BIRDS

FRIS'BY, EDGAR (1837–) An American astronomer, born at Great Easton, Leicestershire, England He graduated from the University of Toronto in 1863 (M A, 1864) After teaching in Canada in 1863–67, he was for a short time acting professor of mathematics at Northwestern University, in 1868–78 was assistant astronomer in the United States Naval Observatory, Washington, and in 1878 became professor of mathematics in the United States navy He observed several eclipses for the government, computed the orbit of the comet of 1882, and had charge of the 12-inch equatorial telescope until his retirement in 1899

FRISCH, frĭsh, JOHANN LEONHARD (1666–1743) A German philologist and lexicographer, born at Sulzbach He studied at Altdorf, Jena, and Strassburg, was for a short time a pastor at Neusohl, Hungary, and after extensive travels settled at Berlin, where in 1727 he was appointed rector of the Gymnasium zum Grauen Kloster In 1706 he became a member of the Royal Scientific Society, and in 1731 director of the historical-philological division Best known and most important of his works is the *Teutsch-lateinisches Worterbuch* (1741), the result of 30 years' labor, the first work of the sort prepared on scientific principles

FRISCHES HAFF, frĭsh'ĕz häf (LG, Freshwater Bay) A large lagoon on the north coast of Prussia, southeast of the Gulf of Danzig (Map Germany, H 1) It is rather less than 60 miles in length from northeast to southwest, with a breadth which varies from 2 miles to 18 miles, and an area of 330 square miles It has a depth of from 10 to 16 feet and was once entirely walled off from the Baltic by the Frische Nehrung, a narrow spit of land extending for about 40 miles along its north shore In 1510, however, the waters of the Frisches Haff broke over the Frische Nehrung and formed the passage called the Gatt, which unites the lagoon with the Baltic The Gatt, originally from 10 to 15 feet in depth, is now dredged to 22 feet All large vessels load and unload at Pillau, which is situated at the mouth of the Gatt, on the shore of Danzig Bay Cargoes are conveyed to and from the ports on the Frisches Haff by means of lighters The lagoon receives the waters of the Nogat, Pregel, Frisching, and Passarge and part of the waters of the Vistula

FRISCHLIN, frĭsh'lĕn, PHILIPP NIKODEMUS (1547–90) A German philologist and Latin poet, born at Balingen, Wurttemberg He studied at the University of Tubingen and became professor of history and poetry there in 1568 Through the jealousy of his colleagues and the hatred of the nobility, whom he had angered by his satiric wit, he was compelled to relinquish his chair and in 1582 became rector of the school at Laibach in Carniola From 1584 to 1587 he was again at Tubingen, but in 1588 became rector of a school at Brunswick Expelled thence in 1589, as the result of a pasquinade, he wandered about for a time and finally was imprisoned in 1590 in the Hohenurach Dungeon at Mainz He broke his neck in an attempt to escape He wrote in Latin some indifferent tragedies, a few comedies, of some

worth, of which the best is *Julius Cæsar Redivivus* (1584), and poems, including principally *De Natali Jesu Christi*, and the *Hebræis*, a hexametric chronicle of the Jewish kings His philological study is best represented by the *Grammatica Latina* (1585) He wrote commentaries also on Vergil and Persius and translated Callimachus and Aristophanes Consult Strauss, *Leben und Schriften des Dichters und Philologen Frischlin* (Frankfort, 1856)

FRISCH'MANN, DAVID (1863–) A Hebrew writer He was born at Lodz and made Warsaw his residence Beginning to write at 13, he soon caused a sensation by declaring relentless war on all the archaic traditions that hindered the development of Hebrew literature Ever after, he endeavored to Europeanize Hebrew learning He made admirable translations of Bernstein's *Naturwissenschaftliche Volksbucher*, Byron's *Cain*, Nietzsche's *Also Sprach Zarathustra*, and many other works His original writings consist of both verse and prose A complete edition of his works in 17 vols (the last consisting of critical comments on his work) was published at Warsaw

FRIS'CO A popular abbreviation of the name San Francisco

FRISI, frē'zē, PAOLO (1728–84) An Italian mathematician He was born at Milan, taught philosophy at Padua, and became, in 1756, professor of mathematics at Pisa and in 1764 at Milan In 1777 he became director of a school of architecture at Milan When less than 23 years of age, he published a remarkable *Disquisitio Mathematica* (1751), upon the physical causes which have determined the magnitude and shape of the earth He also published *De Atmosphæra Cœlestium Corporum* (1758), *De Inæqualitate Motus Planetarum* (1760), *Del modo di regolare i fiumi e i torrenti* (1762). Consult Verri, *Memorie . del signor dom Paolo Frisi* (Milan, 1787), and J C Poggendorff, *Biographisch-literarisches Handworterbuch*, vol i (Leipzig, 1863–1904)

FRISIA See FRIESLAND

FRISIAN. See FRIESIAN

FRIS'IAN LANGUAGE AND LITERATURE (OFris *Frise, Frese*, AS *Frisa*, Lat *Frisii*, possibly connected with OFris *frāse*, danger, AS *frāsian*, Goth *fraisan*, OHG *fraisōn*, to test) The language and literature of a branch of the Germanic family of dialects which was formerly spoken along the coast of the North Sea and on the coast islands from the Rhine to the Ems The Frisians are first mentioned by Tacitus, who divides them into the greater and the lesser. Their boundaries varied at different periods, however, so that the entire coast line from the Scheldt to the Weser has at one time or another been occupied by those who spoke the Frisian language. Of all the Germanic dialects this is the one nearest akin to Anglo-Saxon, so that the two tongues are sometimes classed together as Anglo-Saxon Frisian Thus, we have AS *mōna*, OFris *mōna*, moon, but OHG *māno*, Goth *mēna*, or AS. *æcer*, OFris *ekker*, field, acre, but OHG *acchar*, Goth *akrs* On the other hand, Frisian has many points of association with Dutch and Icelandic which are not found in Anglo-Saxon, as *of*, or, *wēr*, true, while the Icelandic and Anglo-Saxon have the so-called "breaking" of the vowels before *r*, *l* + consonants which does not occur in Frisian, e g, AS *beorh*, Icel *biarg*, hill, but OFris, OHG *berg* It seems probable, on the whole, that the Anglo-Saxons once occupied the land between the Frisians and the Scandinavians, and that of the Anglo-Saxon dialects the Kentish stood nearest the Frisian (e g, OEFris *biade*, he commanded, Kent *biade*, but WS *bēode*), while next to the Kentish in this respect came the West Saxon, and finally the Northumbrian and Mercian

Frisian is divided into numerous dialects, many of which now differ from each other to a surprising degree Indeed, so divergent are many words in the vocabularies of the various dialects that some of the commonest terms become unintelligible after a very short distance It is, furthermore, necessary to bear in mind the strong influence exercised by Danish over the vocabularies of many dialects By a phenomenon, somewhat unusual in language, many terms for the most familiar objects are loan words in Frisian, being borrowed from the Danes

Frisian may be divided first into East and West Frisian, and the former of these again into East and North Frisian The East Frisian, using the term in this restricted sense, is subdivided into the Weser and the Ems dialects This group has been gradually supplanted by Low German (Plattdeutsch), so that what is now often called East Frisian is, in reality, a Low German dialect In 1890, 32 persons on the island of Wangeroog, and about 2000 in the Saterland of Oldenburg still spoke East Frisian The North Frisian group, which formed the vernacular of about 2600 persons in 1885, is divided into seven dialects on the mainland and three on the islands The dialects of the coast have been strongly influenced, not only by Low German, but also by Danish, and island dialects seem to show in addition the presence of West Saxon elements Of Old North Frisian hardly any records exist, the oldest being a short inscription on a font of 1452 at Pelworm Old West Frisian, on the other hand, is represented by literary remains which are relatively extensive, while the New West Frisian is that in which the bulk of modern Frisian literature is composed The dialects of New West Frisian are not separated by such wide divergences as the East and North groups, although they number six, since the majority of the differences are due to the operation of analogy (q v)

The Frisian employs the Roman alphabet, but uses *u*, *v*, and *w*, as well as *c* and *k*, almost indiscriminately The vowels have the Italian values, and the consonants are pronounced in general as in German, excepting that *s* is soft like the English *z*, and that *k* or *c* is frequently palatalized before *e* and *i* to *ch* or *sh* (written *sz*, *sth*, *ts*, *tz*, *tsz*, or, in West Frisian, simply *s*, *z*) There is a tendency to elide *r* and *l* (*dega* beside *degar*, days, Mod Fris *woed*, *woe*, AS *wolde*, Eng *would*) The guttural *g* is often vocalized to *j* (*jeld* for *geld*, payment, cf AS *geard*, Eng *yard*) The old pronunciation of *th*, as in Eng *thorn*, is still retained in some of the island dialects (WFris *thank*, thanks, but NFris *tōnk*) The sound of *h* was extremely weak The morphology of Frisian is essentially Germanic in its type In nouns there are the three genders, two numbers, five cases, and the division into strong and weak declensions Even in modern North Frisian the pronoun retains the dual (*wat* and *jat*, cf AS *wit* and *git*), which has been lost in all other modern Germanic languages The verbs are strong, weak, and preterite present, forming their past

tenses, as in the other dialects of this group, either by ablaut (q v), or by composition with the verb signifying *to do* (e g, Frisian infinitive *finda*, to find, preterite singular *fand*, preterite plural *fundon*, past participle *funden*, AS *findan*, *fand*, *fundon*, *funden*, Fris *hatia*, to hate, preterite *hatade*, *hatadon*, past participle *hatad*, AS *hatian*, *hatade*, *hatadon*, *gehatad*, Fris *mōta*, to be obliged, present singular *mōt*, present plural *mōton*, preterite *mōste*, AS *mōtan*, *mōt*, *mōton*, *mōste*) The passive is formed like the Germanic passive generally, except in Gothic and the Scandinavian dialects, by *wesa* (AS *wesan*), to be, with the past participle (e g, Frisian *ik was funden*, AS *ic wæs fundon*, I was found) The syntax of Frisian follows the general type of the older Germanic languages

Frisian Literature Frisian literature is, relatively speaking, extremely scanty The oldest specimens of Frisian date no farther back than the thirteenth century, although it may be shown by references to the ancient Latin chronicles that here, too, the Germanic epics had flourished at least five centuries before These ancient epics were doubtless alliterative like the Anglo-Saxon and Icelandic poems, but beside the alliteration might be found now and then rhymed verse, as we find it, e g, in Old High German in Otfrid's *Evangelienbuch* As an example of such a verse, which also shows a trace of the older alliteration, we may quote

hē stifte and stōrde treuwe and wērde

(he founded and strengthened fidelity and worth) Of this class of literature the most noteworthy is the so called Privilege of Charlemagne, which purports to confer certain political rights on the Frisians The production is, however, a forgery of the thirteenth century It is written in rhythmic prose The Rudolf Book, claiming to belong to the twelfth century, but probably written two centuries later, is a legendary account of the laws given by one Rudolf to the Frisians, who had been summoned to contribute a levy of troops for service against the Northmen There is also a collection of 1671 verses edited under the title *Thet fresche Rijm*, which is a translation of Low German verses and composed in a barbarous mixture of dialects which renders it practically useless for the study of the language The prose literature is much more extensive and important It begins about the eleventh century with an interlineal translation of the Psalms and with a late Chronicle The remainder of the prose is devoted to legal topics These law books fall into two sections, general and local To the general codes belong, among others, the 17 *Keren* (petitions) and the 24 *Lōndriuchta* (land rights) These were originally written in Latin and later translated into the various Frisian dialects Besides some additions to the Keren, there is also the code of Upstalbōm, dating from 1323 Among the local law books by far the most important class is formed by the Prologues and Tractates The Prologues, as the name implies, are introductions to the codes proper and deal with the history of the land or the dynasty, or treat of the theory and nature of law Old sagas, too, are found in some Prologues, such as the saga of Karl and Redbad or that of Magnus More miscellaneous topics contained in them are descriptions of the Day of Judgment, the Creation, the grades of the priesthood, and the like The Tractates themselves contain the legal codes Tax lists, formulas for taking the oath, letters, and synodical epistles (*sinuthriuchta*) are also found in the prose literature of Old Frisian

The modern Frisian literature dates from the sixteenth century Poetry is dead in East Friesland In 1632 Imel Agena, of Upgant, composed a trivial poem in Alexandrines, which seems to have been a portion of a dance song In North Friesland poetry was little better developed, although there are a few verses preserved, as well as a number of sagas current on the islands The only important piece of North Frisian literature is J P Hansen's comedy *Di Gidtshals of di Sol'ring Pid'ersdei* (Flensburg, 1809, 2d ed with the addition of a story, *Di leddelk Stjuurman*, and some poems, Sonderburg, 1833) The most important of the modern Frisian literatures is the West Frisian, which has a continuous line from the sixteenth century to the present time Between the old and new periods of this dialect there is, therefore, almost no gap, for the last example of Old West Frisian is a law of 1559, and the first specimen of the New is a comic dialogue of 1609, *Een tsamensprekinghe van twee boersche Personen, Wouter en Tialle* Early in the seventeenth century arose one of the greatest names in Frisian literature, that of Gijsbert Japiks (1603–66) He was a true poet, turning especially towards peasant life, rich, too, in love poetry, and in the dialogue with which the modern period had begun He was influenced by Dutch and classical models, but was, nevertheless, unaffected and unpedantic In his last years, however, he lost his early simplicity His imitator, Jan Althuysen (1715–63), like Japiks, made a translation of 52 Psalms and composed in addition many occasional poems From the time of Althuysen till the present, no great literary name has arisen among the Frisians Many brief poems, epithalamia, and the like, have been written, but only comedy deserves any special mention Full of wit, and turning on the difference between the country and city, these plays portray excellently the peasant life Most noteworthy are Eelke Meinderts's *It libben fen Aagtje Ijsbrants, of dy frieske boerinne* (1779), *De tankbrē boerezoon* (1778), *De reys fen Maicke Jakkelis* (1778), and *Het jonge lieuws boosk* (1780)

Of the later Frisian writers, the most noteworthy are the Halbertsma brothers, Joost Hiddes (1782–1869), and Eeltje (1797–1858) The latter was a poet of talent, as is evident from his *Lapekoer fen Gabe Scroar* (1822) and his *Rimen en Teltsjes* (1868) Among other poets may be mentioned P C Salverda (*Iytlijcke friesche Rijmckes*, 1824), Rinse Posthumus, who wrote *Prieuwecke fen friesche Rijmmelerije* (1824) and translated several of Shakespeare's plays, such as *Julius Cæsar* and *The Merchant of Venice* J G van Blom (1796–1871) was a poet of the people, and J F van der Wey-Rutgers, H G van der Veen, and C Wielsma wrote of child life Waling Dijkstra (1821–) is the most prolific of contemporary Frisian authors, while the most elegant is probably Pieter Jelles Troelstra (1860–), who is known not only as a lyric poet, but also as one of the editors of the Frisian monthly, *For Hûs en Hiem*

Bibliography The most complete account of the Frisian language and literature is found in Siebs, "Geschichte der friesischen Sprache," in Paul's *Grundriss der germanischen Philologie*, vol ii (2d ed, Strassburg, 1901–09), and *Ge-*

schichte der friesischen Litteratur, vol iii (ib, 1900), where references to all the literature on the subject are collected Consult also Bendsen, *Die nordfriesische Sprache nach der Mohringer Mundart* (Leyden, 1860), Johansen, *Die nordfriesische Sprache nach der Fohringer und Amrumer Mundart* (Kiel, 1862), Winkler, *Algemeen nederduitsch en friesch Dialecticon* (The Hague, 1874), Cummins, *Grammar of the Old Frisian Language* (London, 1887), Colmjon, *Beknopte friesche Spraakkunst voor den tegenwoordigen Tijd* (2d ed, Joure, 1889), Siebs, *Zur Geschichte der englisch-friesischen Sprache* (Halle, 1889), Van Helten, *Altostfriesische Grammatik* (Leeuwarden, 1890), Outzen, *Glossarium der nordfriesischen Sprache* (Copenhagen, 1837), Richthofen, *Altfriesisches Wörterbuch* (Gottingen, 1840), Sturenburg, *Ostfriesisches Wörterbuch* (Aurich, 1862), Ten Doornkaat Kooman, *Wörterbuch der ostfriesischen Sprache, etymologisch bearbeitet* (3 vols, Norden, 1879–84), Dykstra and Hettema, *Friesch Woordenboek* (4 vols, Leeuwarden, 1896–1903), Richthofen, *Friesische Rechtsquellen* (Berlin, 1840), Hettema, *Oude friesche Wetten* (Leeuwarden, 1845–51), id, *Untersuchungen über friesische Rechtsgeschichte* (Berlin, 1880–86), id, *Bloemlezing uit oud-, middel- en nieuwfriesche Geschriften* (Leyden, 1887 et seq), Siebs, *Sylter Lustspiele* (Greifswald, 1898), Hensler, *Alt friesisches Lesebuch mit Grammatik und Glossar* (Heidelberg, 1903), Kock, "Vocal-balance im Alt friesischen," in vol xxix of the *Beiträge zur Geschichte der deutschen Sprache und Litteratur* (Halle, 1904), Helten, "Zum altfriesischen Vokalismus," in vol xix of the *Indogermanische Forschungen* (Strassburg, 1906), Jackel, "Die alt friesischen Verse vom hute des abba," in vol xxxi of the *Zeitschrift fur deutsche Philologie* (Halle, 1907), Walter, *Der Wortschatz des Altfriesischen* (Naumburg, 1911), Sipma, *Phonology and Grammar of Modern West Frisian* (Oxford, 1913)

FRIT (Fr *fritte*, from It *fritta*, frit, from *friggere*, Lat *frigere*, to parch) An active greenish-black fly (*Oscinis frit*), of the size of a large flea, which does great injury to barley crops in the north of Europe It lays its eggs in the flowers, and its larvæ live on the young grains The family is represented in America by the species *Oscinis variabilis* and other minute "grass-stem flies" of the genera *Meromyza*, *Chlorops*, etc, which damage various crops In the Southern States they swarm in clouds at certain seasons and get into the eyes of animals and men, and to them has been attributed the spread of the disease pink eye (q v)

FRITH, or **FRYTH**, JOHN (1503–33) An English Protestant martyr He was born at Westerham in Kent and educated at Eton and Cambridge, where Gardiner, subsequently Bishop of Winchester, was his tutor Immediately after taking his bachelor's degree (1525), invited by Wolsey, he transferred his residence to the newly founded Cardinal College (now Christ's Church), Oxford He made the acquaintance of Tyndal and assisted him in his translation of the New Testament His zeal in the cause of the Reformation led to his imprisonment at Oxford for some months At the instance of Wolsey he was released (1528) and fled to the Continent, where he resided chiefly at the newly founded Protestant University of Marburg and was again associated with Tyndal in literary labors At Marburg he became acquainted with several scholars and Reformers of note, particularly with Patrick Hamilton (q v) His first publication was a translation of Hamilton's *Places*, made shortly after the martyrdom of the author, and soon afterward appeared *A Pistle to the Christen Reader*, under the pseudonym "Richarde Brightwell" (1529), and *A Disputacion of Purgatorye*, a treatise against Rastell, Sir Thomas More, and Fischer, Bishop of Rochester (1531) In 1532 he ventured back to England Warrants for his arrest were almost immediately issued, at the instance of More, then Lord Chancellor After evading pursuit for some weeks he fell into the hands of the authorities as he was on the point of making his escape to Flanders The rigor of his imprisonment in the Tower was abated when Sir Thomas Audley succeeded to the chancellorship, and it was understood that both Cromwell and Cranmer were disposed to leniency But the treacherous circulation of a manuscript, *Lytle Treatise on the Sacraments*, which Frith had written for the information of a friend, with no view to publication, further excited the hostility of his enemies He was tried and found guilty of denying that the doctrines of purgatory and transubstantiation were necessary articles of faith June 23, 1533, he was handed over to the secular arm and was burnt at Smithfield, London, July 4 During his captivity he wrote a controversial work on the eucharist, and several tracts Frith was the first to maintain the doctrine regarding the sacrament of Christ's body and blood which ultimately came to be incorporated in the English communion office Twenty-three years after his death as a martyr, Cranmer, who had been one of his judges, went to the stake for the same belief, and three years later it had become the publicly professed faith of the English nation Frith's works were published by Foxe (London, 1573), and there was another edition in 1631, Alcock, *Six Heroic Men* (London, 1905)

FRITH, WALTER An English dramatic author and critic, the son of the Royal Academician W Powell Frith He was born in London, was educated at Harrow and Cambridge, then studied law, and became a barrister in 1880 His best-known plays are *Brittany Folk* (1889), *Not Wisely but Too Well* (1898), *The Man of Forty* (1900), *Margaret Catchpole* (1910) He also wrote several novels

FRITH, WILLIAM POWELL (1819–1909) An English figure and genre painter He was born at Aldfield, Yorkshire, and was a pupil of Sass's art school in Bloomsbury and a student of the Royal Academy In 1840 he exhibited his "Malvolio before the Countess Olivia," which attracted much public attention His "Village Pastor," painted in 1845, made him an associate member of the Academy For some time he continued to paint in a similar romantic vein subjects chosen chiefly from Scott, Dickens, Sterne, Goldsmith, Shakespeare, and Cervantes, such as "The Good-Natured Man" and "Dolly Varden" (South Kensington Museum), "Uncle Toby and the Widow Wadman" (Tate Gallery, London), which are good in color and well handled After he was elected a Royal Academician in 1853 he began to depict the humorous aspect of an English crowd in such subjects as "Life at the Seaside, Ramsgate," purchased by Queen Victoria "Derby Day" (1858, Tate Gal-

lery), and the "Railway Station" (1862, Leicester Museum) In spite of their anecdotic and literary character, these works possess real pictorial qualities Frith was commissioned by Queen Victoria to paint the "Marriage of the Prince of Wales" (1865), and made an unsuccessful attempt to rival Hogarth in his series "The Road to Ruin" (1878) and "Poverty and Wealth" His later works include "John Knox at Holyrood" and "Private View of the Royal Academy" His pictures were exceedingly popular and often engraved "The Dinner at Boswell's Rooms" (1869) sold in 1875 for £4567, the highest price then reached for a work by a living artist Frith was a member of several foreign academies and a chevalier of the Legion of Honor Consult Frith, *My Autobiography and Reminiscences* (London, 1887) and *Further Reminiscences* (ib, 1888), Ward, *Reminiscences* (ib, 1911)

FRITHJOFS SAGA, frēt'yōfs sa'ga An ancient Icelandic myth It was probably first written down at the end of the thirteenth or in the beginning of the fourteenth century and records the life and adventures of the hero Frithjof (properly *Fridhthjófr*, peace destroyer), who loved the beautiful Ingeborg, the daughter of a petty king of Norway After being rejected by the brothers of Ingeborg and having committed various acts of revenge on his enemies, he comes to the court of the old King, Hring, to whom Ingeborg has been married, and is received with kindness At the death of her husband Ingeborg is married to her lover, who acquires with her hand the dominions of Hring, over which he rules prosperously to the end of his days Frithjof is supposed to have lived in the eighth century, but some writers assign to him a much earlier period This saga was included by Bjorner in his collection *Nordiska Kampadater* (Stockholm, 1737), and by Rafn in his *Fornaldar Sogur Nordhrlanda* (Copenhagen, 1829) Attention has of late years been more especially drawn to this ancient saga, which is, in fact, merely one of a number of similar mythical narratives, in consequence of the Swedish poet Tegnér (q v) having selected it for the groundwork of a poem, *Frithjofs Saga*, which was published in its complete form in 1825 and at once became the most popular poem that had ever appeared in Sweden and raised its author to the height of his reputation At times the author has preserved the severe sternness of the old viking type, often, however, he has tempered it with the sentimental characteristics of his own age On the whole, the picture of the old Norse life is very much idealized—a fact which has brought the author much adverse criticism But the lyric beauty alone of the poem is enough to insure it a permanent place in Swedish literature Tegnér's *Frithjofs Saga* has been translated into most of the European languages, among the 22 or more English translations, we may instance those by Holcomb (Chicago, 1905) and Shaw (ib, 1911). For poetic beauty, Longfellow's partial translations are unsurpassed Consult H Hermannsson, *Bibliography of the Mythical-heroic Sagas* (Ithaca, 1912), and W A Craigie, *Icelandic Sagas* (New York, 1913)

FRITIGERN, frĭt'ĭ-gĕrn, or **FRIDIGERN** A Visigothic chieftain When, in 376, the Visigoths were crowded from Dacia by the inroads of the victorious Huns, he was permitted by Valens, Emperor of the East, to transport his band, which nominally was Christian (Arian), across the Danube and to settle in Mœsia Quarrels ensued between the immigrants and the Roman officials and culminated in the battle of Adrianople (Aug 9, 378) Fritigern, in principal command of the Visigoths, there destroyed fully two-thirds of Valens's army, thus inflicting a defeat which, for actual loss on the field, was equaled in Roman annals only by the disaster at Cannæ (216 B C) Valens himself was killed, and his body was never recovered Fritigern's leadership for a brief time maintained Visigothic unity, which was dissolved immediately after his death (c 380)

FRIT'ILLARY (from Lat *fritillus*, dicebox, from the form of the perianth), *Fritillaria* A genus of bulbous-rooted plants of the family Liliaceæ, natives of Europe and other temperate regions of the Northern Hemisphere The drooping perianth, which is bell-shaped, has six distinct segments, each with a conspicuous honey pore (nectary) at the base About 40 species, some beautiful, are known One species, the common fritillary, or snake's head (*Fritillaria meleagris*), a native of Great Britain, blooms in April and May in meadows and pastures in the east and south of England The stem, about 1 foot high, bears several linear leaves and, in general, only one flesh-colored, dark-spotted flower Many varieties, including the crown imperial (*Fritillaria imperialis*), a native of Persia and the north of India, are in cultivation Among the indigenous American species, which have scaly bulbs and are confined to the Pacific coast, the best known are *Fritillaria pudica*, *Fritillaria recurva*, and *Fritillaria camtschatcensis*, sometimes called black lily, which occurs from California to Alaska and in Siberia In Alaska the bulbs were formerly gathered, dried, and eaten to a considerable extent They are surrounded by many small white bulblets of the size and shape of a grain of popcorn and are sometimes called wild rice They have been frequently taken from the crops of birds at considerable distances from where they were grown

FRITILLARY (Neo-Lat *fritillaria*, nom pl, from Lat *fritillus*, dicebox), or SILVERSPOT A nymphaline butterfly, of a group mostly the genus *Argynnis*, with fulvous and black checkered wings The hind wing is often marked with a row of silvery eyespots There are more than 50 species in the United States, whose larvæ feed at night on violets The great spangled (*Argynnis cybele*) and the variegated fritillary (*Euptoieta claudia*) are two common North American representatives

FRITSCH, frĭch, ANTON JOHANN See FRIČ.

FRITSCH, GUSTAV THEODOR (1838–) A German scientist and traveler, born at Kottbus (Brandenburg) He studied at Berlin, Breslau, and Heidelberg, in 1863–66 made a scientific journey to South Africa, and in 1867 became an assistant in the Anatomical Institute at Berlin In 1868 he was a member of the expedition to Aden to observe the total eclipse of the sun, and in 1874 of the expedition sent to Ispahan, Persia, to observe the transit of Venus He was appointed in the latter year to the chair of comparative anatomy at the University of Berlin and subsequently to that of physiology Under commission from the Royal Academy of Sciences, Berlin, he visited the Mediterranean countries in 1881–82 for the study of electric fishes His publications include· *Drei Jahre in Sudafrika* (1868); *Die Eingeborenen*

Sudafrikas (1873), anatomical and ethnographical observations, *Die elektrischen Fische* (2 parts, 1887–90), *Die Gestalt des Menschen* (1899, 2d ed, 1905), *Aegyptische Volkstypen* (1904), *Das Haupthaar und seine Bildungsstatte bei den Rassen des Menschen* (1912)

FRITSCH, JOHANN (1849–) A German neurologist, born at Tepl, Bohemia He studied at the University of Vienna, was appointed a lecturer there, and afterward professor of psychiatry His publications include *Ueber die primare Verrucktheit* (1879) and *Erfahrungen uber Simulation geistiger Storung* (1890)

FRITSCH, KARL (1812–79) An Austrian meteorologist, born at Prague He attended the university there, was for a time a government official, but privately pursued meteorological investigations, and from 1862 to his retirement in 1872 was vice director of the Austrian meteorological service Large increase was made by him in the number of observation stations, and he contributed valuable articles to the publications of the Vienna Academy and of the Oesterreichische Gesellschaft fur Meteorologie

FRITSCH, KARL, BARON (1838–1906) A German geologist, born at Weimar He studied at the University of Gottingen and in 1873 became professor of geology at Halle His publications include *Reisebilder von den Kanarischen Inseln* (1867), with Reiz, *Geologische Beschreibung der Insel Teneriffe* (1868), *Allgemeine Geologie* (1888)

FRITZ, frits, DER ALTE (Ger, Old Fritz) A nickname given by the soldiers to Frederick the Great

FRITZ, JOHN (1822–1913) An American expert in the manufacture of iron and steel, born at Londonderry, Pa He was trained as a machinist in small establishments at Parkersburg and Norristown and afterward was employed in the construction of rolling mills In this connection he made so thorough a study of the details of iron and steel manufacture as to become an authority on the subject and to be commissioned with the equipment of the Cambria Iron Works and the well-known Bethlehem Iron and Steel Works For many years he was manager of the latter He was among the first to introduce the Bessemer process into the United States and was a pioneer in other methods now generally used. In his honor a medal was established by a group of scientists and manufacturers, in 1902, to be known by his name and to be awarded in recognition of notable discoveries in industry and science, and in 1910 the Franklin Institute awarded him the Elliott Cresson medal He was president of the American Institute of Mining Engineers in 1894 and of the Society of Mechanical Engineers in 1896.

FRITZ, SAMUEL (1656–1728). A German Jesuit missionary, born in Bohemia He entered the Jesuit Order in 1673, went to Cartagena in 1684, studied at Quito in 1685, and in 1686 became a missionary on the upper Amazon Owing to ill health, he withdrew to the Portuguese colony of Para, at the mouth of the river, and was held prisoner as a spy there until 1691 by the Governor Having been liberated and having reported to the Viceroy at Lima his various observations, he returned to his missionary field in 1693 During his 42 years of activity among the Indians he founded the Omaguas missions and others and prepared the material for his great map of the Amazon This appeared at Quito in 1707, in the *Lettres édifiantes* (vol xii) in 1717, and was for many years the recognized authority on the region included by the river system The Jesuits call him "the Apostle to the Omaguas"

FRITZ, UNSER (Ger, Our Fritz) A name given by the Germans to Frederick William, Crown Prince of Prussia, later Emperor Frederick III

FRITZLAR, frits'lar, HERBORT and HERMANN VON See HERBORT and HERMANN VON FRITZLAR

FRITZNER, frits'nēr, JOHAN (1812–93) A Norwegian lexicographer, born at Asko, near Bergen He was educated at Christiania and after holding several pastorates devoted himself entirely to scientific labors, as a result of which he published the *Ordbog over det gamle norske Sprog* (1861–67, 2d ed, 1883–96), an excellent dictionary of ancient Norse

FRITZSCHE, frit'she, ADOLF THEODOR HERMANN (1818–78) A German classical scholar He was born at Groitzsch, Saxony, and was educated at Leipzig, where, after an activity of several years at the University of Giessen, he occupied the chair of philology from 1850 until his death Besides original poems in Latin and German, he published valuable editions of several works of the Greek and Roman classics, the most noteworthy being the elaborate edition of *Theocritus* (2d ed, 1869) and that of the *Satires* of Horace (1875–76)

FRITZSCHE, FRANZ VOLKMAR (1806–87) A German classical scholar, son of the theologian Christian Friedrich Fritzsche (1776–1850) He was born at Steinbach in Saxony and, after studying under Beck and Hermann at the University of Leipzig, was professor of eloquence and poetry at Rostock from 1828 until his death His works deal chiefly with Lucian and the Greek dramatists, particularly Aristophanes Among the most important are the *Quæstiones Lucianeæ* (1826), an edition of the *Dialogi Deorum* of Lucian (1829), an edition of Aristophanes' *Thesmophoriazusæ* (with a commentary, 1838) and *Ranæ* (1845), and a critical edition of Lucian's complete works (1860–74) In defense of his old teacher, Hermann, he published *Recension des Buches Æschylos Eumeniden von K O Muller* (1834)

FRITZSCHE, KARL FRIEDRICH AUGUST (1801–46) A German theologian, the elder brother of Franz Volkmar Fritzsche He studied under his father and subsequently attended the University of Leipzig After holding a professorship at that institution for one year he was successively professor of theology at Rostock (1826–41) and Giessen (1841–46) His philological interpretations of biblical texts are accurate, and in the defense of his views he was a skillful controversialist His principal works are the commentaries on *Matthew* (1826), *Mark* (1830), and the *Epistle to the Romans* (1836–43)

FRITZSCHE, OTTO FRIDOLIN (1812–96) A German theologian, brother of F V and K F A Fritzsche, born at Dobrilugk, southwest of Frankfort, he studied at Halle, became professor extraordinary at Zurich (1837), full professor (1842), and also chief librarian at the cantonal library in 1844 He published a critical edition of Lactantius (1842–44), *The Life and Writings of Theodore of Mopsuestia* (1836) and his *Exegetical Fragments* (1847), Anselm's *Cur Deus Homo?* (1868), and other works He is best known by his work on the Old Testa-

ment *Apocrypha and Pseudepigrapha* (6 vols, 1851–60)

FRIULI, frē-ōō'lē The name of a district on the north and northeast shores of the Adriatic Sea now forming the Province of Udine, Italy, and the Austrian coast districts of Gorz and Gradiska (Map Italy, D 1) Friuli was anciently one of the 36 duchies into which the Longobards divided the north of Italy It derived its name from that of its chief town, Forum Julii, which was said to have been founded by Julius Cæsar This town is now known as Cividale del Friuli Another important town in the district was Aquileia The district was from an early period divided into Tyrolese and Venetian Friuli, the former of which came into the possession of Austria in 1500, while the latter remained attached to Venice till the Peace of Campo-Formio (1797), when it also was given to Austria Venetian Friuli finally came into the possession of Italy in 1866 The area of the district is about 3300 square miles, its population, about 700,000 The inhabitants, called Furlani, are for the most part Italian, but speak a peculiar dialect, with many words of Celtic extraction Consult Manzano, *Annali del Friuli* (Udine, 1858–79), and Fracassetti, *La Statisca etnografica del Friuli* (ib, 1903) See UDINE

FRIULI, DUKE OF See DUROC, GÉRARD CHRISTOPHE MICHEL

FRIZ'ZLE A breed of fowls, so called from the strangely curled ends of the feathers, especially those of the neck and back They are bred largely for their grotesque appearance, but are hardy and useful

FROBEL, frē'bel, FRIEDRICH WILHELM AUGUST (1782–1852) A German educationalist, the famous promoter of what is known as the kindergarten movement He was born at Oberweissbach in Thuringia, April 21, 1782, where his father was a pastor of the old Lutheran church As his mother died while her son was an infant, the boyhood of the future friend of children was lonely, and his father's second marriage did not increase the happiness of the child. He became strongly introspective, and the severity of the religious influences under which he was trained placed him in a morbid attitude towards life, both the present and the future—a disposition which he overcame in his majority. At the age of 10 years he was sent to his uncle in the town of Ilm, where a happier life began. When 15, he was apprenticed to a forester, and his duties were such that, while he added to his knowledge of the outer world, he could devote himself (as he says) "in many various ways to self-education, self-instruction, and moral advancement Especially did I love to indulge my old habit of self-observation and introspection"

In 1799, when the days of his apprenticeship were over, he went to Jena and for several months came under the influence of the university, where his brother had been enrolled as a student of medicine His studies were irregular and unfruitful, and at length, after confinement for several weeks in the "carcer," because he had not money to pay his bills, he withdrew from the university and secured employment in the Office of Woods and Forests in the Territory of Bamberg He was then brought again into close companionship with nature, for his calling required him to live out of doors in a region of lovely scenery. After a short service of this kind he was engaged as a surveyor in the service of the Bavarian government, and later he became manager of a private estate Having inherited a little property at the death of an uncle, he determined to become an architect and for this purpose went to Frankfort on the Main Gruner, the master of the Frankfort Model School, then said to him "Give up architecture It is not your vocation at all Become a teacher We want a teacher in our own school Say you will agree, and the place shall be yours" The young man accepted, and thus began his educational career Gruner had been a pupil of Pestalozzi, whose name was the watchword of the Frankfort school "It soon became evident to me," says Frobel, "that Pestalozzi was to be also the watchword of my life" So Frobel went to Yverdon and remained for a fortnight on a visit to the great educational reformer, whom he greatly admired, but whose methods he did not wholly approve Uncertainty as to his calling—due perhaps to fickleness, perhaps to versatility, perhaps to genius—still embarrassed him Several openings came to him, but none attracted him So he returned to Pestalozzi and remained many months at Yverdon, where he wrote out an account of the work there in progress His career continued uncertain, and he tried once more the environment of university life—first at Gottingen, and then at Berlin, where he showed such proficiency in mineralogy that his professor, Dr Weiss, gave him an assistant's post in the mineralogical museum War interrupted this service In 1813 he joined Lutzow's famous troop and saw some active service, and again in 1815 he enlisted as a volunteer At the close of the war he determined to devote himself to the promotion of education. A curious passage in his autobiography declares that in the mineralogical laboratory "the stones in my hand turn to living, speaking forms The crystal world, in symbolic fashion, bore unimpeachable witness to me, through its brilliant unvarying shapes, of life and of the laws of human life, and spoke to me with silent yet true and readable speech of the real life of the world of mankind"

His approaching marriage (in 1818) may have had some influence in concentrating his mind upon the purpose of life, for he founded in 1816 a school at Griesheim (afterward removed to Keilhau), called "the Universal German Educational Institute," and in it he proceeded to develop his plans Up to this time all the events of his life had been preparatory He was now 36 years old, his life half gone During the next 34 years his work was accomplished

Eight years later he published his most important book, a volume entitled *Menschenerziehung* (Education of Man), which is a sort of corner stone in his philosophy of education. Notwithstanding its comprehensive title, it really discusses the education of a child The Institute awakened suspicion, and finally opposition, on the part of conservative governments, and the Prince of Schwarzburg-Rudolstadt caused an official inspection of it to be made The report, on the whole, was favorable. Frobel's attention was now called by Krause (a well-known philosopher, whose acquaintance he had made) to the writings of Comenius, and from them he received a fresh impulse towards the development of his educational plans After unsuccessful attempts to establish his Institute at Helba, near Meiningen, and afterward near Lucerne, at Willisau, the Bernese government

invited Frobel to consider a plan for founding an orphanage at Burgdorf To this place he removed in 1835, and success followed the change It is said that he considered at this time a visit to the United States in order to establish his system in a new country He was now committed fully to the doctrine that the education of the nursery must be reformed, and the need of training for mothers became more and more evident to him After a short stay in Switzerland he went to Berlin in 1836, returned to Keilhau, and then established himself in Blankenburg, a small town not far from Keilhau Langethal, Middendorf, and Barop were his serviceable assistants About this time he hit upon the name "kindergarten," which has since been introduced into many lands and many tongues—a much better term than one originally employed by Frobel—"Anstalt fur Kleinkinderpflege" (an institution for the care of little children) His friend Barop tells this story "Middendorf and I were one day walking to Blankenburg with him over the Steiger Pass He kept on repeating, 'Oh, if I could only think of a good name for my youngest born!' Blankenburg lay at our feet, and he walked moodily towards it. Suddenly he stood still as if riveted to the spot, and his eyes grew wonderfully bright Then he shouted to the mountain so that it echoed to the four winds, 'Eureka! Kindergarten shall the institute be called!'"

Embarrassments still beset him His ideas were not generally accepted, he lacked money for the maintenance of his school, his publications were not remunerative, more than this, his nephew, Carl Frobel, a professor at Zurich, became the loud advocate of measures which were radical, if not revolutionary, and Frederick Frobel was accredited with his nephew's opinions In 1851 Von Raumer, Minister of Education and Public Worship, forbade the foundation of kindergartens in Prussia, and the edict remained in force until 1860, long after Frobel's death. After 1850 Frobel made his home in Marienthal, where the Grand Duke of Weimar gave him the use of a country seat Here he was aided in his school by Luise Levin, who in 1851 became his second wife, and by Alwine Middendorf, who married Dr W Lange, the future editor of his writings His death occurred June 21, 1852 The school at Marienthal was then removed again to Keilhau

Frobel's literary style was not good, and his works were never popular, but his thoughts arrested the attention of able and influential people, and by these interpreters and followers kindergarten methods have been introduced into many countries "Let childhood ripen the children," says H C Bowen, "is the keynote of the new gospel" "It is what he did for the education of children between the ages of three and seven that chiefly demands our gratitude" As a statement of his principles, the summary given by H C Bowen is adequate "The main principles, it will be remembered, whose applications form Frobel's system, are self-activity, to produce development, all-sided connectedness and unbroken continuity, to help the right acquisition of knowledge, creativeness or expressive activity, to produce assimilation of knowledge, growth or power, and acquisition of skill, well-ordered physical activity, to develop the physical body and its powers, and happy and harmonious surroundngs, to foster and help all these" (*Frobel and Education by Self Activity*, pp. 180, 181)

The principal writings of Frobel have been collected in three volumes by W Lange (Berlin, 1862) and by Friedrich Seidel (Vienna, 1883) Among them the most important is the *Education of Man*, which appeared in 1826 It has been translated into French and into English The *Mutter- und Kose-Lieder* (Mother's Songs, Games, and Stories) has had many translators The autobiographies were translated by H K Moore and Emilie Michaelis, and in part also by Miss Lucy Wheelock (new ed, London, 1899)

In addition to his own writings, materials pertaining to the life and influence of Frobel are abundant and are enumerated in bibliographies that are readily accessible A selection is not easy Dr Barnard's collection of *Papers on Frobel's Kindergarten* (Hartford, 1881) is comprehensive and important There are two English translations of *The Education of Man*—one by Miss Josephine Jarvis (New York, 1885) and the other by W N Hailman (ib, 1887) The *Mother Play* (2 vols, ib, 1895) was translated by Miss Susan E Blow, who has also written a book on *Symbolic Education* (ib, 1894), a commentary on the first five songs of the *Mother Play*, and a volume entitled *Letters to a Mother* (ib, 1900)

Among the estimates of Frobel's work these citations may be made Henry Barnard declared the kindergarten to be by far the most original, attractive, and philosophical form of infant development the world has yet seen Dr James Ward holds that the kindergarten system, in the hands of one who understands it, produces admirable results, but is apt to be too mechanical and formal F W Parker says that the kindergarten is the most important, far-reaching educational reform of the nineteenth century Mr Quick in his *Educational Reformers* (New York, 1896), from which these words are taken, concludes his estimate by saying that among those who have contributed to the science of education there are probably no greater names than those of Pestalozzi and Frobel The memoir by H Courthope Bowen in the *Great Educators Series*, ed by Nicholas Murray Butler (New York, 1897), is an admirable study of Frobel's principles The fullest biography is that by A B Hanschmann (Eisenach, 1874) A short memoir was written by Miss Emily Shirreff (London, 1887) Of the last four years of Frobel's life there are delightful reminiscences by an accomplished enthusiast, the Baroness von Marenholtz-Bulow (trans by Mrs Horace Mann, Boston, 1887) Two autobiographical fragments (a letter to the Duke of Meiningen and a letter to the philosopher Krause), which narrate the perplexities and obstacles of his early life, are contained in a volume entitled *Autobiography of Frobel* (Syracuse, 1889) It also includes a convenient bibliography Consult also Fletcher and Welton, *Froebel's Chief Writings on Education Rendered into English* (New York, 1912) See KINDERGARTEN, PEDAGOGY, CHILD PSYCHOLOGY

FROBEL, JULIUS (1805–93) A German writer and politician, nephew of Friedrich Frobel After studying at Munich, Weimar, and Berlin, he went to Switzerland, and in 1833 became professor of mineralogy in the industrial and high schools of Zurich In the interests of the extreme Radical party he edited *Der schweizerische Republikaner* In 1844 he gave up his

professorship and established a publishing house at Zurich and issued several scientific works and many political pamphlets Some of his works were suppressed by the government In 1846 he took up his residence in Dresden until the revolution of 1848, when he became a leader of the Democrats and a member of the National Assembly at Frankfort-on-the-Main He accompanied Robert Blum to Vienna and was arrested and sentenced to death, but was pardoned by Windischgratz on account of his brilliant mind After the dissolution of the Parliament he came to the United States (1849), edited a German paper in New York, went in 1850 to Nicaragua, and afterward engaged in one or two commercial expeditions to Santa Fe and Chihuahua In 1855 he edited a journal in San Francisco and in 1857 returned to Germany From 1862 to 1873 he edited newspapers in Vienna and Munich He was German Consul at Smyrna from 1873 to 1876 and at Algiers from 1876 to 1889 He retired from active life in 1890 His works include *Aus Amerika* (1857–58), translated by himself in 1859 under the title of *Seven Years' Travel in Central America, Northern Mexico, and the Far West, Die Wirtschaft des Menschengeschlechts* (1870–76), *Ein Lebenslauf* (1890–91), his autobiography

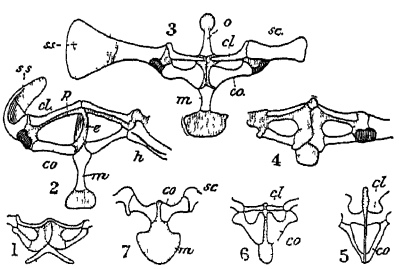
FROBEN, frō'ben, or **FROBE'NIUS**, JOANNES (c 1460–1527) A German scholar and printer He was born at Hammelburg, was educated at the University of Basel, and established in Basel, in 1491, a printing press, at which the art of printing was first brought to a high degree of excellence in Germany An intimate friend of Erasmus, he printed his writings and had his help in editions of St Jerome, St Cyprian, Tertullian, Hilary of Poitiers, and St Ambrose Luther used Froben's Greek Testament of 1516, edited by Erasmus, for his translation Holbein illuminated texts for Froben Froben did not live to carry out his project of editing the Greek Fathers, but it was done by his son Jerome and his son-in-law, Nikolaus Episcopius See ERASMUS

FROBERGER, frō'bĕr-gĕr, JOHANN JAKOB (c 1605–67) A German organist, born probably at Halle When very young, he entered the Imperial choir in Vienna, in 1637 was court organist there, and the same year went to Rome to study under Frescobaldi He was again court organist (1641–45 and 1653–57) in Vienna, and then made a series of concert tours, appearing with great success in London and Paris Froberger is a most important figure in the history of organ music, combining German power of expression with Italian nicety of form He died at Héricourt, France Consult F Beier, *J J Froberger* (Leipzig, 1884)

FROBISHER, frŏb'ĭsh-ēr, SIR MARTIN (?1535–94) An English navigator and the first of his nation to seek a northwest passage to China He was born either at Doncaster or Altofts in Yorkshire and belonged to a family which came originally from Wales His early years were spent in voyages to the coast of North Africa and to the Levant In 1575, at the instigation of Elizabeth, he received a license from the Muscovy Company to search for the Northwest Passage With two vessels (the *Gabriel* of 25 tons and the *Michael* of 20 tons) and a pinnace of 10 tons, he sailed north in 1576 and sighted the southern point of Greenland, which he took to be the Friesland of the brothers Zeni Here a storm occurred in which the pinnace was lost and the *Michael* deserted But with the *Gabriel* Frobisher came a few days later to a cape he named Queen Elizabeth's Foreland, near the southeast end of Frobisher Bay, which he supposed to be a strait After a fortnight's exploration of the coasts and islands he returned to England, bringing with him some "black earth" from which originated a rumor of the discovery of gold The prospect of unlimited wealth aroused the attention of the merchant adventurers of the time A second expedition, better equipped than the first, was fitted out, and the command was given to Frobisher He sailed in May, 1577, but his activity was chiefly confined to hunting for gold, and his discoveries, which were comparatively trifling, were restricted to the locality which he had previously visited A third expedition, with 15 ships, was sent out in the year following, with no other result than the discovery of a new strait, which was not explored until the time of Henry Hudson Frobisher afterward served under Drake in the West Indies and was knighted for distinguished service in the fight with the Spanish Armada (1588) In the spring of 1591 he was sent by Sir Walter Raleigh with a squadron to ravage the Spanish coast and hold the attention of the Spanish fleet while efforts were made to intercept the merchant vessels laden with bullion on their way from Panama He died in November, 1594, from the effects of a wound received while leading an attack by sea against Brest, then in the hands of the Spaniards The narrative of Frobisher's three voyages may be found in the Hakluyt Society Publications for 1867 For an account of his life, consult Jones (London, 1878)

FROBISHER BAY. An inlet of Davis Strait, in North America, opening westward between Hudson Strait and Cumberland Sound, into the territory called the Frobisher Meta Incognita, at the south end of Baffin Land (Map North America, M 3) It is about 200 miles long and above 20 wide, with rugged mountainous shores It was till Hall's voyage called Frobisher Strait, being erroneously regarded as a passage into Hudson Bay

FROG (AS. *frogga*, Icel *froskr*, OHG *frosc*, Ger *Frosch*, ultimately connected with OHG



TYPES OF SHOULDER GIRDLE

1, 2, Arciferous (*Bombinator* and *Bufo*), 3–7, Firmisternal types (3, adult *Rana*, 4, young *Rana*, showing change from arciferous to firmisternal type with advancing age, 5, *Himinsus*, 6, *Breviceps*, 7, *Cacopus*) Cartilaginous parts are dotted, ossified parts are left white Lettering. *cl*, clavicle, *co*, coracoid, *e*, epicoracoidal cartilage, *h*, humerus; *m*, metasternum, *o*, omosternum, *p*, precoracoid, *sc*, scapula, *ss*, suprascapula

frō, Ger *froh*, joyous, Skt *pru*, to jump) Any member of the Ranidæ, a family of tailless Amphibia, of the group Firmisternia (q v), i.e., the two halves of the shoulder girdle meet and

are firmly united in the median ventral line, so that the chest cannot be expanded, and in this family, as distinctive from other Firmisternia, the sacral diapophyses are cylindrical The young, known as "tadpoles," live in the water, have fringelike external gills, which disappear while they are still young, are without legs, and have a tail provided with a membranous swimming fin

The family Ranidæ is divided into three subfamilies, according to the arrangement of the teeth 1 Ceratobatrachinæ, with teeth in both jaws This is represented alone by the great horned, tree-climbing frog (*Ceratobatrachus guentheri*) of the Solomon Islands, which is remarkable chiefly for its extraordinary adaptation in color and appearance generally to its customary surroundings, giving it entire concealment from ordinary observation 2 Raninæ, with teeth (vomerine) in the upper but none in the lower jaws This is the group of true frogs, regarded as a family by most authors previous to 1901, and typified by the genus *Rana*, which contains about 140 species 3. Dendrobatinæ, an aberrant group of South American and African frogs, with no teeth at all. They are small and usually brightly colored and take remarkable care of their young, the mother allowing the tadpoles to fasten themselves by a secretion to her back when their native puddle dries and thus carrying them to a safer place One Brazilian species (*Dendrobates tinctorius*) furnishes from its skin the poisonous secretion used by bird fanciers to change the color of the plumage of the Amazon green parrots

There are about 270 species of Ranidæ, which are distributed over nearly all parts of the world except Australia, but there are very few species in South America and these only in the northern part In the United States the family is well represented by 13 species of the genus *Rana* Of these the bullfrog (*Rana catesbiana*), so named on account of its bellowing note, is perhaps our most widely known, as it is our most characteristic, frog It is very large, attaining a length of 8 inches, loves the shore, and is green, with olive and dusky blotches (See BULLFROG) It is equaled in size only by an East Indian species (*Rana tigrina*) and by one in the Solomon Islands (*Rana guppyi*) The leopard frog (q v), or shad frog (*Rana virescens*), is green or often brassy-colored, with two rows of black, white-edged blotches on the back It is the commonest North American *Rana* The wood frog (*Rana silvatica*) is small and reddish brown, with a dark band on each side of the head, it is the most silent frog of the genus, and avoids water except at the breeding season, and its brown color well conceals it among the fallen forest leaves The green spring frog (q v) (*Rana clamata*) inhabits cold springs It is brown or green above and white below and may be readily distinguished by the very large eardrums Like most aquatic animals, frogs can change slightly the color of the skin, according to external conditions. Two species of *Rana* are common in Europe, viz, *Rana esculenta* and *Rana temporaria*. The latter alone is indigenous to Great Britain, and varieties of it extend throughout temperate Europe and Asia to Japan, and one (variety *pretiosa*) exists in the western United States The edible frog (*Rana esculenta*), however, has been introduced into England An Indian species (*Rana breviceps*) and several South African species burrow in the ground

FROG CARRYING TADPOLES

Besides the true frogs, several other families, such as the spadefoots (Pelobatidæ), the tree frogs (Hylidæ), and the piping frogs (Hylodes), are often so called These show structural affinities which bring them as near to the toads as to the frogs, and are described elsewhere under their separate names

Ecology and Habits The skin of frogs is usually smooth and free from warts or horny excrescences It is invested with a colorless epidermis, which is shed from time to time as the creature grows, this splits along the back and thighs, is worked over the head like the taking off of a shirt, and is usually eaten by the wearer The deeper layers contain much pigment, in cells which are more or less under muscular control, enabling frogs to change their hue to conform to the background (For further information on this point, see METACHROSIS, TREE FROG) The skin also secretes in numerous glands a viscid milky fluid, which is of poisonous character—in some species very decided—and is their only defensive property That obtained from a South American frog is said to be used as an arrow poison by the Amazonian Indians In a rare East Indian form, the arboreal flying frog (q v), the skin spreads into broad webs between the greatly extended toes, enabling the animal to make long sailing leaps, analogous to those of the flying squirrel All frogs move on land by leaps, which are often of surprising vigor and extent

Frogs are carnivorous and in the season of activity are likely to be very voracious The terrestrial and arboreal forms feed mainly on insects, worms, etc The aquatic kinds also catch insects, but subsist more on aquatic animals—worms, tadpoles, small fishes, and other frogs These are seized and slowly swallowed—often, where the prey is large, so slowly that the engulfed parts will be digested before the remainder, perhaps still alive, has been got within the mouth

Extremes of cold or drought in climate must be avoided by frogs Moisture of the skin is necessary to their health, and in very dry places or seasons they survive only by going deeply underground Thus some tropical species get through the "dry season" The frogs of northern climates endure the winter by clustering about spring holes and other places where the water is comparatively warm and free of ice, or else by hibernating in the mud Terrestrial species bury themselves for the winter in the loam, or burrow into the dry dust of rotting logs and stumps Their vitality is strong, and their power of regeneration from partial congelation is very great

Though most species live always in or near water, many spend the greater part of their time away from it and often in bushes or trees These, however, go to the water to breed, and as this function is likely to demand attention early in the spring, it is then that these animals make themselves most conspicuous by the incessantly uttered croaking or rattling calls of the males, which are almost as varied as the songs of the birds and more ventriloquistic These are

wholly the cries of the male frogs and cease when the mates have been found and have spawned, and to assist in producing them many species have gular air sacs, which are connected with the vocal organs and furnish the power required for the loud and insistent utterances. The great eardrums correlated with this vocal power are conspicuous in many species

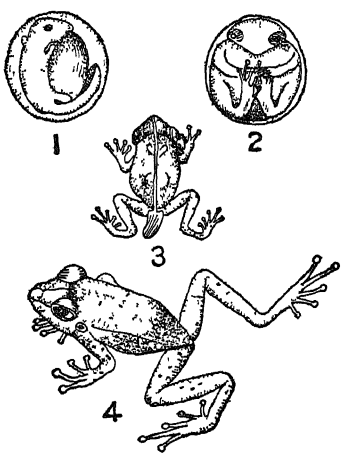
The reproductive habits of frogs are various All of our common species lay their eggs in

ACTION OF FROG'S TONGUE IN CATCHING A FLY

water, the eggs being fertilized as they are laid As the eggs are laid, they are inclosed in a gelatinous envelope secreted by the female This swells and protects the eggs from injury, from being fed upon, from the direct rays of the sun, and in some species it serves to float the eggs at the surface of the water, where oxygen is most abundant, finally, the envelope serves as food for the young frog The mouth of the tadpole is small and provided with a horny beak, which takes the place of the teeth which are not yet developed The tadpole feeds on algæ that cover stones and on the flesh of dead animals The long, spirally coiled intestine, which can be seen on the underside of the animal, is an adaptation to its prevailingly herbivorous diet, which requires a prolonged digestion

The tadpole usually lives in the water for two or three months before it takes to land In the bullfrog, however, the transformation (see TOAD) does not take place until the second summer

In many tropical frogs the reproductive habits are much modified One species (*Phyllobates trinitatis*) of Venezuela and Trinidad carries its



DEVELOPMENT OF HYLODES

Life history of *Hylodes martinicensis* 1 An egg with embryo about seven days old 2 Embryo twelve days old 3 Young frog just hatched, 4 Adult male, natural size

tadpoles on its back, to which the young attach themselves by means of their suckers A frog of the Seychelles Islands lives in the tree ferns far from water and carries its young about on its back, to which they are attached by their bellies. In the Kameruns lives a frog that lays its eggs in a foamy mass on the leaves of a tree. When the larvæ are developed, the mass becomes slimy, and the tadpoles swim about it, and when a heavy rain falls, they are washed into pools of water lying at the bases of the trees The foam is probably produced, as it is in culinary operations, by air being entangled in it by a beating that the frog gives the jelly with its feet The inclosed air may well serve in respiration Cf TOAD

Utilities Among both civilized and savage men frogs are a culinary dainty The edible European frog is so much prized in France that it is bred for the market in large preserves In the United States both the bullfrog and spring frog are sold in the markets In France and the United States the hind legs alone are eaten, they are known as "saddles" to American marketmen and are usually served at table fried In Germany all the muscular parts are served stewed, often with sauce Frogs have enabled man to contribute much to his knowledge of physiology The tail of the tadpole, so frequently fed on by dragon fly larvæ and other aquatic enemies, has great capacity of regeneration The study of its re-formation has added to our knowledge of the regeneration of animal tissue The circulation of the blood, so readily seen by the aid of the microscope in the web of the frog's foot, is a classic and painless classroom demonstration Observations on the response of frog muscle to stimuli led the great Italian physiologist Galvani to the discovery of dynamical or current electricity, known to us as galvanic or voltaic electricity See TREE FROG, *Factors of Organic Evolution*, in article EVOLUTION

Fossil Forms Fossil frogs and toads have been found in the Eocene phosphate deposits of southwestern France, and they seem to be identical with or very closely allied to the modern genera *Rana* and *Bufo* The Miocene deposits of Germany, France, and Bohemia have also furnished fossil frogs and toads The genus *Palæobatrachus* of the Oligocene lignites has been obtained in large numbers in both the larval tadpole stage and the adult tailless condition Tailed batrachians, Stegocephalia (q v), were common members of the late Paleozoic and Mesozoic faunas The stories of living frogs and toads being found in the middle of freshly broken blocks of stone, so commonly told in various parts of the country, are scarcely worthy of credence They have originated either in deliberate falsehoods or in misapprehension on the part of the original observer.

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See Colored Plate of AMERICAN FROGS AND TOADS, accompanying the article TOAD

FROG See RAILWAYS, *Frogs and Switches*

FROG See HORSE, HORSESHOEING

FROG, FLYING See FLYING FROG

FROG, NICHOLAS, or NIC A national nickname for the Dutch It first occurs in Arbuthnot's *Law is a Bottomless Pit*

FROG'BIT A popular name of certain water plants of the family Hydrocharidaceæ See ANACHARIS, VALLISNERIA

FROG'FISH. One of a family of fishes (Antennariidæ), allied to the anglers They are remarkable for excessive ugliness The head is larger than the body, flattened, and spiny, the mouth is very large, with many teeth, the lips are often furnished with filaments, the pectoral fins are supported by a short stalk or wrist The skin is naked in some species, scaly in others The species are numerous and widely distributed, and many inhabit the deep sea They hide themselves in the sand to surprise their prey Cf ANGLER, and see Plate of ANGLERS AND BATFISH

FROG FLY, OR FROGHOPPER. See FROTH FLY

FROG'MORE A royal palace and mausoleum in the Home Park, 1 mile southeast of Windsor Castle, Berkshire, England The palace, purchased in 1800 by Queen Charlotte, was the residence of Queen Victoria's mother and of Edward VII when Prince of Wales The handsome mausoleum of Romanesque architecture, erected in memory of Prince Albert, contains the remains of the Prince Consort and Queen Victoria

FROG'MOUTH One of a group of large birds of the East Indian and Australian region, constituting a subfamily, the Podarginæ, of the nightjar family, Caprimulgidæ They are noted for the very wide mouth, especially in the birds of the genus *Batrachostomus,* which is capable of completely engulfing small birds They have a soft plumage and are largely nocturnal, like the owls. They have no oil gland, but possess a pair of large powder-down patches, one on each side of the rump One of the best-known species is the Australian "more-pork" (q v) See Plate of NIGHTJARS, GUACHARO, ETC

FROGS, THE One of the most brilliant of the comedies of Aristophanes (q v)

FROG SHELL A small gastropod mollusk of the genus *Ranella,* closely related to the tritons (family Tritonidæ), so called because of a fancied resemblance of its rough, flattened form and mottled colors to a frog. There are many species in tropical waters, all of which feed upon decaying matter and are useful scavengers See Colored Plate of MARINE GASTROPODS

FROGS' LEGS See FISH AS FOOD

FROG SNAKE See MATTIPI

FROG SPAWN. The popular name of certain fresh-water algæ which make green and slimy masses on the surface of ponds and sluggish streams The name is applied properly to the gelatinous mass inclosing the ova of frogs See ALGÆ, FROG

FROG SPITTLE (so called because formerly believed to be the spittle of frogs) A frothy substance appearing on weeds, grasses, etc, and produced in self-protection by the nymphs of certain plant bugs, called froth flies (See FROTH FLY) In England the substance is called cuckoo spit

FRÖHLICH, frē'lĭk, ABRAHAM EMANUEL (1796–1865) A Swiss poet, born at Brugg From 1835 until his death he was pastor at Aarau His poems and fables are very popular, and the fables rank high among literature of that variety His works include *Fabeln* (1825), *Das Evangelium Sankt Johannis in Liedern* (1830) *Elegien an Wieg' und Sarg* (1835), the epics *Ulrich Zwingli* (1840), *Ulrich von Hutten* (1845), and *Johann Calvin* (1864) His collected works were published in 1853

FROH'MAN, CHARLES (1860–1915) An American theatrical manager, one of the leaders of what is commonly called the Theatrical Trust, of which he became the producing partner He was born in Sandusky, Ohio While a youth he was advance agent for a traveling minstrel show, later, after a period as independent manager of various companies "on the road," he established himself in 1893 at the Empire Theatre, New York, and in the season of 1895–96 formed with several managerial firms the so-called "syndicate" He brought out as stars Maude Adams, Julia Marlowe, John Drew, and other well-known actors In 1905–06 he managed E H Sothern and Julia Marlowe in their notable series of Shakespearean productions He also became interested in several theatres in London, and was largely instrumental in effecting the system of exchange of successful plays which now exists between England and the United States He died on the *Lusitania*

FROHMAN, DANIEL (1853–) An American theatrical manager, born in Sandusky, Ohio In his youth he was employed in newspaper work in New York, but he early embarked in theatrical management with traveling companies Previous to 1885 he managed the Fifth Avenue and Madison Square theatres, and more recently the Lyceum and Daly's Theatre, besides the Daniel Frohman Stock Company and various special attractions He related himself closely to the so-called Theatrical Trust, formed by his brother Charles Frohman

FROHSCHAMMER, frō'sham-ẽr, JAKOB (1821–93). A German theologian and philosopher, born at Illkofen, near Ratisbon, and educated at Munich For more than 40 years he was associated with the University of Munich, where he occupied the chair of philosophy from 1855 until his death He had been ordained a priest in 1847, but because of his radical utterances on theology, especially for his *Beitrage zur Kirchengeschichte* (1850), which was put on the Index Expurgatorius, he was compelled to resign his position as preacher at the university in 1855, in 1862 an apostolic brief denounced him, and in 1871 he was excommunicated He refused to join the Old Catholics and in 1862 founded the *Athenaum* as a Liberal Catholic organ A large number of his writings were directed against the authority of the Church in matters of science, the freedom of which he defended in the work entitled *Ueber die Freiheit der Wissenschaft* (1861) He attacked the dogma of infallibility with equal vigor in a number of publications, which involved him in a long and bitter controversy with Catholic theologians In his philosophical writings he defends the idealistic conception of the universe—a conception possible through a central principle which he defines as "fantasy" This idea is carried out in his books, *Monaden und Weltphantasie* (1879), *Die Philosophie als Idealwissenschaft und System* (1884), and *Ueber das Mysterium Magnum des Daseins* (1891). Con-

sult his autobiography in Himrichsen's *Deutsche Denker* (1888), and critical studies by Friedrich (1899), Attenspeiger (1899), and Munz (1894)

FROHSDORF, frōs'dôrf or **FROSCHDORF**, frōsh'dôrf (originally Krottendorf) A village of Lower Austria, 30 miles south of Vienna, on the right bank of the Leitha It has acquired some political significance, owing to the fact that its castle was the residence of the Duchess of Angoulême after 1844 and later of the Count of Chambord (q v), and became the rendezvous of the elder Bourbon party Pop , 1900, 706

FROISSART, frwa'sar', JEAN (c 1338–?1410) A French poet and historian, born at Valenciennes He was destined for the Church and consequently received a liberal education, but he soon displayed a passion for poetry, for the tales of chivalry, and for travel He visited England and Avignon, and in 1361 he went to London to present to Queen Philippa a poem concerning the recent war between England and France It secured for him a position as secretary to the Queen, who encouraged him to continue his work In 1365 he made a journey to the Scottish court at the expense and under the protection of Queen Philippa. In 1366 he left England in the train of the Black Prince and in 1368 visited Italy under the protection of the Duke of Clarence Upon the death of his patroness the Queen, in 1369, he returned to Valenciennes Soon, however, he found new patrons who admired his writings In 1370 he entered the service of Duke Wenceslas of Luxemburg He was also befriended by Robert of Namur, to whom he dedicated the first book of his Chronicles, and by Guy of Châtillon, who in 1373 appointed him curé of Lestinnes-au-Mont For 10 years he led an uneventful life, working upon his Chronicles or composing poems with Duke Wenceslas In 1383 or 1384 he became the chaplain of Guy of Châtillon, who had just inherited the County of Blois Then for 15 years Froissart traveled much, seeking men who could tell of the great wars in which they had taken part Thus in 1388 he visited the court of Gaston Phœbus at Béarn To this journey we owe the striking description of this remarkable tyrant, whom Froissart admired In 1394 he visited England a second time Little is known of his life after he returned from England, and the date of his death is uncertain

The work for which Froissart is famous is his four books of Chronicles, in which he recorded the events and wars of the last three-quarters of the fourteenth century He was engaged on this work for over 40 years He had little critical ability and recorded supernatural tales with as much credence as he gave to knightly feats of arms Nevertheless he gives a masterly account of the character and manners of his age He was able to describe most of the localities from his own knowledge, and he was fortunate in being able to consult important actors in every war which he described Thus, he learned of the Scottish wars from King David, of Crécy from King Edward, of Poitiers from the Black Prince, of the famous Great Companies from their commanders, of the death of Wat Tyler from Robert of Namur, who had been present

In the first redaction of his first book he borrowed freely from Jehan le Bel's Chronicle Later he made two revisions, and in each he deleted many of the portions borrowed from Jehan le Bel One defect in his work, considered as an historical source, must be noted Froissart was far from being impartial In the first redaction of his first book he was an English partisan In the second redaction he suppressed much that was favorable to England In the third redaction, which he made after 1400, when he was filled with grief for the murder of Richard II, the grandson of his former patroness, he made some very severe reflections on the English nation The best editions of his Chronicles are those of Kervyn de Lettenhove (25 vols, Brussels, 1863–77) and Luce (Paris 1869–88, incomplete), in the publications of the Societe de l'histoire de France There are many other editions and translations, for which see Molinier, *Les sources de l'histoire de France*, vol iv (Paris, 1904) Special mention should be made of the fine old English rendering by Lord Berners Froissart is also noteworthy as a poet He wrote many verses, which were greatly appreciated by his patrons His first production was entitled *L'Epinette amoreuse* (The Little Thorn of Love) and is an account of his boyhood and first love affair The *Dit du florin*, which is partly autobiographical, is the most pleasing of his poetical works The most lengthy was his *Meliador*, which he read to Gaston Phœbus It is a poem twice as long as the *Divine Comedy* of Dante and is an echo of the tales of the "Round Table", but although it contains beautiful and interesting passages, as a whole it is exceedingly prolix and tiresome It has been published by Longnon for the Société des Anciens Textes (3 vols, Paris, 1895–99) The other poems have been published by Scheler (3 vols, Brussels) For Froissart's life, consult the introductions to the two editions of his Chronicles, which have been cited, the secondary works given in Molinier, and especially Mary Darmesteter, *Froissart* (Paris, 1894)

FROLIC, THE A British sloop of war captured in 1812 by the American sloop of war *Wasp*, under Capt Jacob Jones, who received a medal from Congress for the exploit

FROLICH, frē'lĭk, LORENTZ (1820–1908). A Danish painter, illustrator, and etcher He was born at Copenhagen studied there under Eckersberg, in Dresden under Bendemann, and in Paris under Couture Afterward he lived much in Rome and in Paris, where he constantly exhibited at the salons In 1877 he was appointed professor at the Copenhagen Academy His illustrations, especially of children's books and old Danish ballads, are known everywhere and are more important than his paintings He also furnished original etchings for Fabricius, *History of Denmark*, for Apuleius, *Cupid and Psyche*, The Lord's Prayer, *Die Gotter des Nordens*, and many other works Among his paintings are 'King Harold Blaatand" (1840), "Cupid and the Water-Sprite" (1845, Leipzig Museum), "Family of a Wood-God", and decoration in the Court of Appeals at Flensburg, Prussia, and in some public buildings of his native land

FROLLO. A Roman knight, serving as Governor of France and killed by King Arthur, in an Arthurian legend of the fifteenth century entitled *Arthur*, and other chronicles

FROME, formerly FROME SELWOOD An agricultural and manufacturing town in Somerset, England, on the Frome, a branch of the Avon, 12 miles south-southeast of Bath (Map England, D 5) Frome has a museum and a school of art Its staple products are broadcloths, woolen goods, dyestuffs, silks, hats, ale, cards

for dressing woolen cloths, cutlery, and ironware The town owns its water works The celebrated Selwood Forest, part of which still exists, was in the vicinity Pop, 1901, 11,057, 1911, 10,901

FROMENTIN, frō'man'tăn', EUGÈNE (1820–76) A French painter and author He was born near La Rochelle, France, Oct 24, 1820 His father was a physician of note, who had an inclination towards art, which he had cultivated while a student in Paris. In November, 1839, at the age of 19, Eugène was sent to Paris to study law He became also much interested in literature and was associated intimately with eminent authors, as Benjamin Fillon, Michelet, Quinet, and Sainte-Beuve He wrote much himself and at this time formed the vivid and charming style so well known in his later works Not until 1840, at the age of 20, did Fromentin show any disposition towards painting In 1843 he received his license in law and began to study for the doctor's degree At this time he decided to abandon law and first entered the atelier of a mediocre painter, named Rémond, but a year later changed to that of Cabat Fromentin occupied several studios in Paris, but finally settled in a little hotel in the Place Pigalle, which he occupied during the rest of his life In 1846 occurred his first visit to Algeria, which decided the main direction of his interest in life and art, for he is essentially the painter of northern Africa, the Sahara, and its oases. From 1847, when he first exhibited his Sahara pictures in the Salon, he was chiefly in the Sahara or in Paris

Interest in Fromentin culminated in the Salon of 1859, when he received a first medal and the cross of the Legion of Honor. The attention of Paris and the world had been especially awakened by his two newly published works, "Un été dans le Sahara," which first appeared in the *Revue de Paris* (1856) and "Une année dans le Sahel," in the *Revue des Deux Mondes* (1858)—published together in 1878 by Plon, in a memorial edition, superbly illustrated with Fromentin's pictures of the Sahara Fromentin also wrote a novel, *Dominique* (1862), characterized by delicacy of observation and sincerity of feeling His most important literary effort is his critical work, *Maîtres d'autrefois* (1876), an appreciation of Dutch and Flemish painting His paintings are characterized by brightness and harmony of color, excellent draftsmanship, and spirited execution Among the most important are "A Farm Near La Rochelle" (1847), his earliest work, "Gazelle Hunt in the Hodna" (1857), "A Street in El-Aghouat" (1859), "An Arab Bivouac at Sunrise," in the collection of Edouard Delessert, Paris, "The Falcon Hunt" (1863), and "An Arab Camp," his last picture, in the Louvre, which possesses six other pictures by him Several good examples of his works are in America, notably in the Walters collection, Baltimore, and in the Vanderbilt collection and the Metropolitan Museum, New York Fromentin died suddenly at Saint-Maurice, near La Rochelle, Aug 27, 1876 Fromentin's letters were published, with biography and notes, by Blanchon (1909) Consult *Vingt-cinq dessins de Eugène Fromentin par Montefiore, texte biographique par Burty* (Paris, 1877), Gonse, *Eugène Fromentin, peintre et écrivain* (ib, 1881), Jouin, "Fromentin," in *Maîtres contemporains* (ib, 1887), Claretie, "Eugène Fromentin," in *Peintres et sculpteurs contemporains* (ib, 1882), Huther, *History of Modern Painting* (New York, 1907)

FROMMANN, frō'man, GEORG KARL (1814–87) A German philologist, born in Coburg He was librarian of the Germanic Museum and edited the periodical *Die deutsche Mundarten* In 1865, with 10 other Protestant theologians, he undertook the revision of Luther's translation of the New Testament This revision was subsequently extended, at the request of the Protestant Conference, to the Old Testament, and the revised edition of the complete Bible appeared in 1892 Consult the memoir by Vogt (Nuremberg, 1888)

FROMMEL, frō'měl, EMIL (1828–96) A German theologian and author He was born at Karlsruhe and studied at Halle, Erlangen, and Heidelberg After holding several pastorates, he served as army chaplain in the Franco-German War of 1870–71 and in 1872 was appointed court preacher at Berlin and pastor of the garrison in that city His principal theological works include *Die zehn Gebote Gottes in Predigten* (6th ed, 1898), *In drei Stufen*, an anthology (8th ed, 1890), *Festflammen* (6th ed, 1896), *Das Gebet des Herrn in Predigten* (4th ed, 1893) He also wrote tales and miscellaneous essays, collected and published under the title of *Gesammelte Schriften, Erzählungen für das Volk, Aufsatze und Vortrage* (1873–97)

FROMMEL, GASTON (1862–1906) A Swiss theologian, born in Alsace From 1894 until his death he was professor of theology at the University of Geneva Like Vinet, he followed the method of psychological analysis of conscience and also emphasized personality as the summation of reality He made liberty, however, of secondary importance, as being conditional upon the Divine Will Consult G Godet, *Gaston Frommel* (Neuchâtel, 1906)

FROMMEL, KARL LUDWIG (1789–1863) A German landscape painter and engraver, born at Birkenfeld, Oldenburg He studied at Karlsruhe, under F J Becker and Haldenwang, visited Paris, and earned a considerable reputation in Italy (1812–17) On his return he was appointed professor at Karlsruhe, where he founded the Society of Art and Industry for the Grand Duchy of Baden After a visit to London, in 1824, to acquaint himself with the technique of steel engraving, he opened at Karlsruhe, in conjunction with the Englishman Winkles, a studio for that branch of art From 1830 to 1858 he was director of the picture gallery, which owes to his clever administration its present flourishing condition In it are preserved several of his attractive landscapes Among his best plates are six original etchings and the engravings "Arricia Near Rome," "View of Tivoli," "Mount Vesuvius," and "Mount Ætna" They are characteristic in conception and delicate in execution

FROMMEL-LINDEMANN, lĭn'de-man, KARL AUGUST See LINDEMANN-FROMMEL

FROMONT JEUNE ET RISLER AÎNÉ, frō'mōn' zhĕn ä rē'slā' ä'nā' (Fr, Fromont Jr and Risler Sr). A novel by Alphonse Daudet (1874)

FROND (Lat *frons*, OLat pl *frundes*, foliage) In botany, a term applied to a shoot in which stem and leaves are not differentiated Among the lower plants this would apply to the bodies of many liverworts, to the sexual body (gametophyte) of ferns, etc, but in these cases the term "thallus" is more generally used Perhaps the most general application of the term

"frond' has been to the leaves of ferns, which arose from a misconception as to the real character of a fern leaf Since in common ferns the leaves seem to arise directly from the ground, the older botanists concluded that they represent a combination of stem and leaf and therefore called them fronds This application of the term has been abandoned by botanists, but it is still in general use The only application of the term now in scientific use is in connection with certain flowering plants, such as the duckweed (*Lemna*), in which there is no differentiation of stem and leaves The application of the term to the leaves of palms has been merely a popular recognition that they resemble the leaves of ferns

FRONDE, frōnd (Fr, sling) The name given to the period of domestic intrigues and political troubles in France during the minority of Louis XIV, from 1648 to 1653 The grasping and despotic policy of Mazarin had given offense to all classes The princes and nobles saw themselves excluded from all high offices in the state, and their places filled by foreigners, the Parlement of Paris saw itself threatened in its political rights, and the people complained of the burden of taxes and administrative abuses The Parlement, therefore, commenced a course of determined opposition, refusing to register the royal edicts, more especially the financial measures initiated by Mazarin At first the opposition was along constitutional lines, but finally it was turned by the nobles into a struggle to get back the civil and political rights which they had lost under Richelieu Among the leaders in opposition, in addition to the first President, Mathie Molé, were the councilors Blancmesnil and Broussel After Condé's victory over the Spaniards at Lens (Aug 20, 1648) had strengthened the hands of the court party, violent measures were determined on, and on Aug 26, 1648, Blancmesnil and Broussel were arrested by order of Mazarin The people took up arms, dispersed the Swiss Guard, and on the 27th of August erected barricades in the street around the Palais Royal. The court, without an army at the time in Paris, now removed to Rueil, and after some negotiations yielded in so far that an ordinance was issued regulating the financial and judicial administration of the realm This victory gave courage to the supporters of the Parlement who continued to keep a sharp lookout on the court and were styled by the adherents of Mazarin *frondeurs*, i e, censurers (literally, slingers) The court, when the army returned after the Treaty of Westphalia, resolved to suppress the movement, and on Jan 6, 1649, removed secretly to Saint-Germain, leaving Paris to be blockaded by the Prince of Condé with 7000 men The Parlement, instigated by the astute Cardinal de Retz and publicly supported by various nobles, including the Prince of Conti, the dukes of Longueville, Beaufort, Bouillon, and Elbeuf, and the Maréchal de la Mothe, called upon the people to resist A sanguinary encounter at Charenton resulted in the defeat of the Frondeurs, and they were forced to enter into negotiations for peace. Accordingly, a treaty was made at Rueil, March 11, 1649, granting a general amnesty and regulating the matter of financial control After the return of the court to Paris in August, a new turn was given to the contest, the princes of the blood disputing the power with Mazarin This, on Jan 18, 1650, led to the sudden arrest of Condé, Longueville, and Conti, which was the beginning of the new Fronde The young sons of Louis XIII were roused against Mazarin, and Marshal Turenne assumed the title of lieutenant general of the royal army for the liberation of the princes After some initial successes Turenne, who was fighting in conjunction with the Spaniards, was finally completely defeated by Mazarin's troops under Du Plessis-Praslin, near Rethel, on Dec 13, 1650 Mazarin returned to Paris, but found all parties against him, and his removal was insisted upon so urgently that he was obliged to release the princes and flee to the Netherlands A system of intrigue was now substituted for force of arms, and the contest, which had begun for the interests of the people, was converted into a court cabal Turenne was gained over by the Queen Regent, Anne of Austria, De Retz by Cardinal Mazarin, and Condé, who had made himself generally odious by his haughty conduct, was obliged to flee for safety into Guienne Louis XIV, who had now attained his fourteenth year, endeavored to induce Conde to return, but the latter, mistrusting the King's overtures, repaired to Bordeaux in 1651, where he had many adherents There he commenced a regular war against the court which might have had dangerous consequences had not Turenne opposed the Prince A large force of Spanish regulars were continually under his command, and people gradually came to look upon him as a foreign invader On July 2, 1652, an engagement took place between the two parties in the outskirts of Paris Condé was in danger of defeat, when, through the efforts of his friends, he was allowed to enter Paris Paris itself, weary of these fruitless dissensions, now entered into negotiations with the court, demanding, however, the final removal of Mazarin, who had meanwhile returned This demand was complied with by Louis XIV, and the royal entry took place Oct 21, 1652 Various nobles were exiled as a result of the contest Condé, who refused to enter into the compact, and had quitted Paris on October 15, repaired to Champagne, and finally, finding no one disposed to take up arms in his cause, entered the Spanish service and was declared a traitor Mazarin returned to Paris and was once more intrusted with the reins of government Thus ended the period of the Fronde in Paris, but the last signs of revolt in the provinces were suppressed only in 1653 The defeat of the Frondeurs contributed to make Louis XIV an absolute monarch Consult Barante, *Le parlement de Paris et vie de M Molé* (Paris, 1859), Perkins, *France under Richelieu and Mazarin* (New York, 1888), Pardoe, *Louis XIV and the Court of France, etc* (London 1888), *Memoirs of Cardinal de Retz* (ib, 1896), Gordon, *The Fronde* (Oxford, 1905), *Lettres du Cardinal Mazarin* (Paris, 1878–1906) See CONDE, LOUIS XIV, RETZ, CARDINAL DE, TURENNE

FRONSPERG See FRUNDSBERG, GEORG VON

FRONSPERGER, frōns'pĕrk-ĕr, LEONHARD (c 1520–75) A German writer on the art of war He was born at Ulm and began the study of military science in early boyhood In his celebrated *Kriegsbuch kaiserlicher Kriegsgerechte und Ordnungen vom Geschutz* (1573, 4th ed, 1596, rendered into Modern High German by F W A Bohm, vol 1, 1819), he displays a remarkable knowledge of army organization, equipment, fortification, military law, articles of war, and artillery practice He was the

most competent German military writer of the sixteenth century

FRONTAL BONE See SKULL

FRONT DE BŒUF, frŏn de bĕf In Scott's *Ivanhoe,* a ferocious baron, who threatens Isaac the Jew in order to extort money

FRONT'ENAC A city in Crawford Co, Kans., 100 miles south of Kansas City, on the Atchison, Topeka, and Santa Fe, the Joplin and Pittsburgh, and the Kansas City Southern railroads (Map Kansas, H 8) It is important as the distributing centre for the productive coal region in which it lies The water works are owned by the city Pop, 1900, 1805, 1910, 3396

FRONTENAC, frŏnt'nak', LOUIS DE BUADE, COMTE DE (1620–98) The greatest of the governors of New France He was born in France in 1620 At an early age he entered the military service and rapidly attained promotion He became colonel at 23 and brigadier general at 26 and saw active service in Italy, Flanders, and Germany In 1672 he was appointed to succeed De Courcelles as Governor of New France Frontenac was choleric and arbitrary by nature, but extremely energetic, and sincerely ambitious to inaugurate an era of prosperity for Canada His first act was to convene the three estates—clergy, nobles, and commons—and to establish municipal government in Quebec The royal policy, however, was adverse to the granting of extensive political rights to the Canadians, and the Governor's reforms in this direction were disapproved and his power was decreased as well, by increasing the power of the council and reestablishing the office of intendant He next became involved in controversies with the Jesuits, with the Intendant Talon, and with Perrot, the Governor at Montreal The first were determined to make the state subordinate to the church These quarrels divided the colony into factions, and led at length to the recall of Frontenac in 1682 In 1689 he regained the King's favor and was restored to his former position, which he held until his death, in November, 1698 Frontenac's first administration was especially marked by energy and tact in his dealings with the Indians, and by his encouragement of French explorations in the West He aided Joliet, Marquette, and La Salle, and established posts at Mackinac, Niagara, and in the Illinois country After his reappointment he waged a vigorous war against the Iroquois, who had reduced Canada to desolation, and against their allies and instigators, the English The frontier towns of New England and New York were repeatedly ravaged by his punitive expeditions His most signal achievement in these campaigns was the show of force by which he foiled Sir William Phipps's fleet before Quebec in 1690 At different times he might have made peace with the Iroquois if he had been willing to abandon to their vengeance his Algonquin allies, but this he steadfastly refused to do, and it was not until his last campaign in the Mohawk country in 1696 that the Iroquois were brought to sue for peace Frontenac, for his bravery and success, was decorated with the cross of St Louis Consult. Winsor, *Cartier to Frontenac* (Boston, 1894), Parkman, *Frontenac and New France under Louis XIV* (ib, 1877), Le Sueur, *Count Frontenac* (Toronto, 1906)

FRONTERA, frŏn-tā'ra A seaport on the Gulf of Campeachy, in the State of Tabasco, Mexico, 230 miles east by south of Vera Cruz (Map Mexico, N 8) It is the port of San Juan Bautista, the capital of the state, and has a good harbor, which is being improved by extensive works Its exports, valued in 1912 at $2,083,327, comprise coffee, cocoa, hides, rubber, and dyewoods Its imports, valued at half the above amount, consist of machinery, iron, steel, and cotton goods Frontera is the residence of the United States Consul Pop, 1910, 5760

FRONTIER, MILITARY The furthermost limits of military lines of national defense, observation, and concentration By the mutual consent of countries contiguous to each other the military frontier is usually placed some little distance back of the actual geographical dividing line The sentries of England and Spain at Gibraltar are separated by a strip of land agreed upon as neutral territory With the principal military countries of Europe the various mobilization schemes are designed to secure the greatest possible concentration on the frontier, where they are knitted together by a more or less complete system of forts or intrenched camps Both France and Germany keep their frontier corps at a much higher peace strength than the remainder of their armies The most important British Indian camps of exercise, as well as their strongest points of concentration, are along the military frontier of northwestern British India The *Militargrenze,* or military frontier, was the former name of a narrow strip of land along the Turkish frontier in Hungary and Croatia-Slavonia, which had a special military constitution See FORTIFICATION, MOBILIZATION

FRONTINO, frŏn-tē'nō The horse of Rogero, in Ariosto's and Boiardo's *Orlando*

FRONTI'NUS, SEXTUS JULIUS A Roman author, who flourished in the second half of the first century AD In 74 AD he was sent to Britain as governor of that island and obtained a great reputation by his conquest of the Silures and his vigorous maintenance of the Imperial authority He appears to have been twice consul and to have held several other important offices, notably that of *curator aquarum,* or water commissioner He died about 105 Several works are attributed to Frontinus, only two of which are certainly genuine—the *Strategematica,* a treatise on the art of war, in three books, and the *De Aquis Urbis Romæ,* in two books The latter is a highly important technical account of the Roman aqueducts and the marvelous water supply of the ancient city There is an edition of the *Strategematica* by Gundermann (Leipzig, 1888), and of the *De Aquis* by Herschel, in *Two Books on the Water Supply of the City of Rome* (Boston, 1899, 2d ed, London, 1913), including the text, translation, explanatory chapters in the Introduction, and commentary, numerous illustrations, and maps of the routes of the ancient aqueducts

FRONT'ISPIECE (from OF *frontispice,* ML *frontispicium,* front view, from Lat *frons,* front + *specere,* to look) The name generally given to an engraved and decorated titlepage of a volume, or an engraving or other illustration placed opposite the titlepage The term was formerly used in architecture to denote the front or principal face of a building, particularly when it is a screen without organic connection with the building.

FRON'TO, MARCUS CORNELIUS A teacher and author He was born at Cirta, in Numidia, and came to Rome in the reign of the Emperor

Hadrian, where he soon obtained a high reputation as a teacher of eloquence and as an orator Antoninus Pius intrusted to him the education of Marcus Aurelius and Lucius Verus, both of whom always retained the warmest admiration of their preceptor Fronto gradually rose to the highest offices of the Empire, became very wealthy, and died, it is thought, about 175 A D Until 1814 nothing was known of Fronto as an author, except from a few fragments of a grammatical treatise (*De Differentiis Vocabulorum*), but in that year Angelo Mai discovered in the Ambrosian Library at Milan a palimpsest which, being deciphered, was found to contain a considerable number of Fronto's letters, with some short essays These were published by Mai in 1815, in 1816 an edition was published at Berlin by Niebuhr, who wrote a critical preface, and also printed the commentaries of Buttmann and Heindorf A few years afterward Mai found in the library of the Vatican at Rome another palimpsest containing more than 100 of Fronto's letters, including his correspondence with the Emperor and with his royal pupils The result was a new edition by Mai (Rome, 1823), embodying the new discoveries The contents of these letters are on the whole unimportant, although they help to confirm the good opinion which history has formed of the Emperor Marcus Aurelius The best edition of Fronto is by Naber (Leipzig, 1867). Fronto belonged to the archaizing school of Latin writers, who found their models in the authors before Cicero Consult Knapp, "Archaism in Aulus Gellius," in *Classical Studies in Honor of Henry Drisler* (New York, 1894), Ellis, *The Correspondence of Fronto and M Aurelius* (Oxford, 1904), Brock, *Studies in Fronto and his Age*, a strong plea for Fronto against adverse modern judgments (Cambridge, 1911), Teuffel, *Geschichte der romischen Litteratur* (6th ed, Leipzig, 1913)

FRORIEP, frō'rēp, ROBERT (1804–61) A German physician, born at Jena and educated at Bonn In 1833 he received a call to the Pathological Museum of the Charité at Berlin, of which he was director for nearly 13 years His medical and surgical atlases are widely known They include *Chirurgische Kupfertafeln* (96 parts, 1820–47), *Klinische Kupfertafeln* (12 parts, 1828–37), *Atlas der Hautkrankheiten* (1837), *Pferderassen* (6th ed, 1874), *Atlas Anatomicus* (6th ed, 1877) His treatise *On the Therapeutic Application of Electro-Magnetism in the Treatment of Rheumatic and Paralytic Affections* (Eng trans by R M Lawrence, 1850) was a very important contribution to electrotherapy in its day

FROSCHDORF, frōsh'dōrf See FROHSDORF

FROSINONE, frō'zē-nō'nā A city in the Province of Rome, south Italy, 955 feet above the sea, 53 miles southeast of the city of Rome, on the river Cosa near its junction with the Sacco (Map Italy, D 4) Here are ruins of the ancient Volscian town, Frusino Frusino is mentioned by Juvenal, iii, 224, as a place where one might buy property for less than the cost of one year's rental of a dark hole at Rome It produces and markets wine Pop (commune), 1901, 11,191, 1911, 11,646

FROSSARD, frō'sar', CHARLES AUGUSTE (1807–75) A French general. He was born at Versailles, studied at the military school at Metz, and served with distinction in the engineers He participated in the siege of Rome in 1849, commanded the Second Engineer Corps in the Crimean War, and in 1855 became brigadier general He was chief of the engineering department during the Italian campaign of 1859 and in 1867 was appointed governor of the Prince Imperial In the war with Germany he commanded the Second Corps of the Army of the Rhine, with a greatly superior force drove the Prussians out of Saarbrucken (Aug 2, 1870), but was defeated four days later at Spicheren (or Forbach), where he had dug intrenchments At Metz (August 16), when his troops were retreating, he gave the costly order that the Imperial Guard cavalry should charge, and he was taken prisoner when Bazaine surrendered and was detained until the close of the war He published a *Rapport sur les opérations du deuxième corps de l'armée du Rhin dans la campagne de 1870* (1872)

FROST (ME *frost, forst*, AS *forst*, from *fricosan*, Eng *freeze*) A formation of ice on the ground or on plants, also the temperature 32° F or 0° C that corresponds to the formation of ice and snow When air whose dew point is below 32° F comes in contact with a substance whose surface is colder than this, a portion of the aqueous vapor in the air is condensed upon that surface in the form of ice or frost, although this deposition is truly ice, yet the particles of ice are usually small, separate from each other, and reflect the rays of light in such a way as to make the deposit appear white, like crushed ice, instead of being transparent, as is the case with solid ice In fact, the particles of ice usually have a crystalline structure, more or less perfect, as may easily be seen when moisture is deposited on the inside of a windowpane when the temperature outdoors is below freezing In the latter case, when the air within the room has a dew point far above the freezing temperature, the moisture first condenses in drops of dew upon the pane of glass, but is afterward frozen into ice if the exterior cold is sufficiently intense

When the air of the room has a dew point below the freezing temperature, then the moisture is deposited upon the windowpane directly in the form of spiculæ or slender prisms of ice, and it is under these circumstances that the most delicate frost figures are formed The latter is also the ordinary case in the formation of frost on vegetation and on the ground in the open air, in such a case every object is studded more or less thickly with small crystals of ice, the whole deposit is as white as snow and is usually called "hoar frost" It frequently happens that rain (or sleet, which is frozen rain) falls on objects that are already colder than 32° F In such cases the rain or sleet remains congealed as a layer of almost transparent ice on the upper surfaces of the limbs, the leaves, the fences, and other objects This usually happens when rain falls at the close of a period of very cold weather On the summits of high mountains, notably Mount Washington and the mountain stations of southern Europe, it frequently happens that, although the air is apparently clear, yet it is filled with the most minute drops of water, which are cooled far below the freezing point, but retain their liquid condition When these strike any object, they lose their spherical shape and are converted immediately into ice at the temperature of 32°. They therefore build up an accumulation of ice on the windward side of every object, giving

rise to remarkable displays of so-called "frost-work"

Aeronauts have occasionally ascended into and through thin layers of air bearing similar aqueous globules that are cooled below freezing, but still liquid water These layers appear from a distance like thin stratus clouds, but are scarcely perceptible when viewed directly from below on account of their transparency The globules instantly change to snowflakes or frost-work when they strike any object

Tender vegetables in northern gardens and tropical plants in the southern portion of the United States and in California are severely injured or killed by freezing temperatures The mere deposition of frost on the outside of such plants does not necessarily argue that the plant is frozen through and through, it may therefore produce only slight damage, on the other hand, when the air is too dry to deposit much moisture, and when it deposits frost only when cooled greatly below 32° F, it often happens that the plants are frozen under a clear sky or during a cold, dry wind without the deposition of much, if any, frost upon their exterior surfaces, in such cases the sap within the cells and especially within the medullary rays is frozen, the structure of the plant is destroyed, and when the sun's warmth has melted the frozen sap, the leaves and stalks sink to the ground, wilt away, and turn black, being in fact dead This phenomenon is known as "black frost" It is, however, more properly a freeze than a frost

The interval between the last frost of spring and the first frost of autumn is the so-called growing season of the agriculturists Between these dates tender plants of all kinds must perfect their crops, while those that can withstand frosts continue their growth uninterruptedly Especially must the great staple crops of the country—the Indian corn or maize, the cotton, tobacco, and a large range of tender fruits, as well as spring wheat, rye, and buckwheat—all complete their growth between these dates The accompanying maps show by curved lines the regions in the United States over which the first and last frosts occurred on given dates on the average of the past 30 years A comparison of these maps will therefore show the length of time that is available as a normal growing season in any part of the country Although agriculturists always select seed that is likely to produce a quick-growing crop that may be harvested before the early frost of autumn, yet, owing to the irregularities of climate, the late spring frosts, and the early autumn frosts frequently bring their crops into jeopardy This has stimulated the invention of many methods of frost protection, which are fully described in the *Monthly Weather Review* for the years 1894–97 and 1910–11, and especially in *Bulletins on Frost Protection*, issued by the United States Weather Bureau

The methods of frost protection are divided into several categories, as follows· 1 A light screen of any material, even a few slats or a gauzy veil, stretched above a plant prevents the radiation of the plant's heat into space and by reflecting back the heat from the soil may keep the temperature of the plant so high as to prevent frosty temperatures. 2 Fires with clouds of smoke warm the air of a field, while the smoke cloud prevents radiation, in perfectly still air such a cloud of smoke will spread evenly in all directions and continue effective through the night 3 Without reliance upon a cloud of smoke, one may warm the ground and the air either by fires or by streams of water or by flooding the field All these methods and various combinations of them are in regular use for the protection of tropical fruits in California and Florida and for the protection of tobacco, cranberries, and early vegetables in Northern States Many patented devices for making smudges are on the market, but in general the smudge disfigures the fruit, and other protective devices are preferred

Although the tender portions of plants are destroyed by frost, yet the ripened mature seed is much less susceptible The kernels of both corn and wheat may be subjected to very low temperatures without being injured Unfortunately many of the bacterial germs and fungoid spores also are not injured by cold It was formerly supposed that freezing weather destroyed the germs of malarial and yellow fever, but it is now probable that such germs are not affected by cold, but that, on the other hand, the cold checks the mosquitoes and other insects by which these germs are introduced into the human body

The prediction of frost is a matter of great importance to a farmer and can usually be made with great exactness by the help of the daily weather map, wherefore special attention is paid to this subject by the officials of the Weather Bureau All persons whose interests depend largely upon the knowledge of frost keep in close touch with the Weather Bureau and receive special telegrams when freezing temperatures are approaching In general, when the dew point is below 32° F and the night is still and clear, the temperature will fall rapidly, and it may reach the freezing point before sunrise

Air Drainage. This name is extensively applied to a type of convective local circulation of the air occurring chiefly during the nighttime and often playing an important part in the distribution of frosts, especially in regions where hill and valley conditions form a conspicuous feature of the topography As the words suggest and as is generally supposed, the air on the higher slopes, becoming heavier as it cools, flows or drains down into and fills the valley locations, there forming a lake as it were of cold air, the warmer air being found higher up the slopes Thus the valley regions experience heavy frosts, while the higher slopes escape The conditions are generally pretty well recognized and understood by gardeners and horticulturists, who avoid the low valleys and prefer the upper slopes for their gardens and orchards The idea, however, that the flow of cold air downhill into the valley resembles the flow of water under the action of gravity, is quite erroneous and not in accord with the fundamental principles of thermodynamics

The type of air drainage in hill and valley locations now under consideration occurs chiefly when little or no wind prevails and during a night of comparatively cloudless skies following a still, warm, sunny afternoon During the course of the day the soil and surface vegetation becomes strongly heated by solar radiation, the air in contact therewith is also heated and ascends more or less vertically, cooling by expansion as it rises. As a result of the active vertical convection thus established during the daytime, the air for several hundred feet above

the surface is in a state of adiabatic equilibrium in which the temperature diminishes at a rate of slightly more than 0 5° F per 100 feet When nightfall sets in, cooling takes place rapidly by radiation from the soil and vegetal cover The free masses of air cool only very slowly, but those next to the soil and among the foliage of trees, plants, etc, cool rapidly by contact The surface air in the bottom of the valley remains practically where it is, the cooling by radiation goes on continually, and, since the air in the valley is constrained to remain there, it grows colder and colder in proportion to the loss of heat made possible by the clear skies and the active radiation The surface air on the slopes is also cooled by contact with the cooled soil and vegetation and flows downhill to a slight extent In this descent, however, the air is heated by compression at the adiabatic rate of 0 5° F per 100 feet. Moreover, the surface air below it is already dynamically as cold or colder and denser than the air up the slopes. What happens then, briefly, in hill and valley locations on still, clear nights is that the surface air in the valley cools chiefly by contact with the cooling soil and vegetation, and with very little motion remains where it is, becoming colder and colder The surface air on the slopes also cools in a similar manner, descends slightly, and not remaining close to the surface flows out to overspread laterally the lakelike mass of cold air that has formed in the valley Thus this lakelike mass continually grows in depth and extent throughout the night, with the temperature warm at its top and colder at its bottom The "drainage" is not along the surface of the ground from the upper edges of the "lake" to the bottom, but from the hill slopes slightly down and then out over the surface of the lake Similar lines of relatively horizontal flow beginning tangential to the slopes also occur in the intermediate layers of the atmospheric lake

Frosts will occur over regions occupied by lakes of cold air, as described above, whenever the conditions of humidity are favorable and the temperature falls to or below 32° F It is also apparent why the upper levels of the hill slopes may be warmer than the lower valleys

A somewhat similar explanation of "air drainage" has been published in the *Bulletin, Mount Weather Observatory*, vol. vi, pp 118–124 (Washington, 1914)

Inasmuch as severe frosts have sometimes been very destructive to the staple crops, they have occasionally been the direct cause of severe famines, lists of memorable frosts for the last 400 years will be found in Andrews, *Famous Frosts and Frost-Fairs in Great Britain* (London, 1887), also Walford, paper on "Famines" in *Journal of the Statistical Society* (ib, 1878) The record for the United States will be found most conveniently in Pierce on *The Weather* (Philadelphia, 1860) and in the successive numbers of the *Monthly Weather Review* (Washington)

A special and elegant form of frostwork occurs as "ice needles" or "ice columns," that rise up in masses from gravelly ground, raising up the top layer of gravel and small stones on their summits to a height of two, four, or six inches These ice columns are hollow, and are apparently formed by the freezing of the films of moisture that rise up from the lower warm wet soil and freeze on the under side of the top layer of stones when the latter are chilled by radiation during clear nights These columns do not form when the air is cold enough to freeze the soil below the top layers A similar formation exudes from a thin crack in the bark of a tree when the body of the tree affords moisture enough The mechanics of this process is treated by Prof Cleveland Abbe in the *American Meteorological Journal* for April, 1893 (Detroit), and by W W Coblentz in the *Monthly Weather Review*, August, 1914 (Washington)

Consult also the following works Beals, *Forecasting Frost in the North Pacific States, Weather Bureau Bulletin 41* (Washington, 1912), Cox, *Frost and Temperature Conditions in the Cranberry Marshes of Wisconsin, Weather Bureau Bulletin T* (ib, 1910), Day, *Frost Data of the United States and Length of the Crop Growing Season, . Weather Bureau Bulletin V* (ib, 1911), Fassig, "Period of Safe Plant Growth in Maryland and Delaware," *Monthly Weather Review*, vol xlii, p 152 (ib, March, 1914), E B Garriott, *Cold Waves and Frost in the United States, Weather Bureau Bulletin P* (ib, 1906), *Canada's Fertile Northland* (Department of Interior, Ottawa, 1907), Stupart, 'Climate of Yukon Territory," *Transactions of Canadian Institute* (Toronto, 1906) Hann, "Zum Klima Manitoba," *Meteorologische Zeitschrift* (Vienna, 1894), Hann, "Zum Klima von Winnipeg, Manitoba, 30-jährige Temperaturmittel," etc, *Meteorologische Zeitschrift* (Vienna, 1905).

FROST, Arthur Burdett (1851–) An American caricaturist and illustrator He was born at Philadelphia and at 15 worked as an engraver and afterward as a lithographer, but was in the main self-taught Subsequently he was employed by the New York *Graphic*, and in 1876 he changed to Harper and Brothers, where he was associated with Abbey, Reinhart, and Alexander Frost's works show thorough draftsmanship Honesty, healthy and delightful humor, and convincing naturalness are the principal characteristics of the artist He draws all the elements that compose the picture with equal interest and sympathy His first illustrations for a volume, entitled *Out of the Hurly-Burly* (1872), attracted much notice Other important illustrations are found in Stockton, *Rudder Grange* (1879), Octave Thanet, *Stories of a Western Town* (1893), Bunner, *Stories of a New York House* (1887) Publications of his own are· *Stuff and Nonsense* (1888), *Bull Calf, and Other Tales* (1892), *The Golfer's Alphabet* (1898), *Sports and Games in the Open* (1899), *Book of Drawings* (1905)

FROST, Edwin Brant (1866–) An American astronomer He was born at Brattleboro, Vt, and graduated in 1886 from Dartmouth College, and also studied at Princeton, Strassburg, and the Royal Astrophysical Observatory at Potsdam, Germany At Dartmouth he was instructor (1887–90), assistant professor of astronomy and director of the observatory (1892–95), and professor (1895–98) He became professor of astrophysics (1898) and director of the Yerkes Observatory (1905) at the University of Chicago After serving six years as an assistant editor he became editor of the *Astrophysical Journal* in 1902 In 1896 he was secretary of the American Association for the Advancement of Science His researches include particularly stellar velocities in the line of

sight, stellar spectroscopy, sun spots, and thermal radiation of the sun In 1911 Dartmouth conferred on him the degree of D Sc He translated, revised, and enlarged J Scheiner's *A Treatise on Astronomical Spectroscopy* (1894)

FROST, GEORGE HENRY (1838–) An American publisher He was born in Ontario, Canada, and graduated as civil engineer from McGill University in 1860 He was a railroad engineer and land surveyor at Chicago until 1878, when he moved to New York City He founded the *Engineering News* in 1874 and published it until 1911 He became president of the Courier-News Publishing Company and a member of various engineering societies of the United States and Canada

FROST, JACK See JACK FROST

FROST, JOHN (1800–59) An American compiler He was born in Kennebunk, Me, studied at Bowdoin and graduated at Harvard (1822), and taught in Boston and in Philadelphia, where he had a girls' school in 1828–38, and afterward until 1845 taught in the Central High School He published many school books, juveniles, and historical and biographical compilations, among which may be mentioned *Pictorial History of the United States* (2 vols, 1844), which was exceedingly popular, *Pictorial History of the World, Lives of American Generals, American Naval Biography*

FROST, PERCIVAL (1817–98) An English mathematician, born at Hull He attended school at Beverley and Oakham and in 1835 entered St John's College, Cambridge Although as a boy he showed great aptitude for classics, at Cambridge he devoted his attention chiefly to mathematics He was made a fellow of St John's in 1839, and on his marriage in 1841 he became tutor in mathematics, among his pupils being, somewhat later, W K Clifford He held a mathematical lectureship at Jesus College for 12 years, and afterward at King's College for 30 years, becoming fellow of King's and taking his degree of D Sc (Cambridge) in 1882 His chief works were *A Treatise on the Principia* (1854), *A Treatise on Solid Geometry* (with Wolstenholme, 1863), *A Treatise on Curve-Tracing* (1872). Consult Taylor's biographical note in the *Proceedings of the London Mathematical Society*, vol xxix (London, 1898)

FROST, WILLIAM EDWARD (1810–77) An English historical and portrait painter He was born at Wandsworth in September, 1810, and studied chiefly in the schools of the Royal Academy At first he painted portraits, but, under the influence of Etty, devoted himself to mythological subjects, many of which were inspired by Spenser and Milton In 1839 he exhibited "Prometheus Bound," for which he received the Academy's gold medal. In 1847 he won a competition prize at Westminster Hall by his cartoon, "Una Alarmed by the Fauns" Among his principal paintings are "Una and the Wood Nymphs" (1847), painted for Queen Victoria; the "Disarming of Cupid" (1850), painted for the Prince Consort, "The Sirens" (1849), which is particularly good in color, "Narcissus" (1857), "Hylas and the Nymphs" (1867), "Masidora" (1871) The Dublin Museum possesses "Dancing Nymphs", the Victoria and Albert Museum, London, "Contemplation" and two studies His pictures, which were frequently engraved, are highly finished but deficient in color and design Some of his smaller canvases, however, have considerable grace and charm He was elected to the Royal Academy in 1870

FROST, WILLIAM GOODELL (1854–) An American college president, born at Le Roy, N Y In 1876 he graduated at Oberlin College (A M, B D, 1879), and later he studied at Wooster (Ph D, 1891), Harvard, and Gottingen universities At Oberlin he was instructor in Greek in 1877–79 and professor of the Greek language and literature from 1879 to 1892 As president of Berea College after 1892 he did much to promote higher education among the "mountain whites" He is author of *Alpha A Greek Primer Introductory to Xenophon* (1889), *Inductive Studies in Oratory* (1890), *University Extension in the Southern Mountains* (1898)

FROST BIRD, or **FROST SNIPE** An American gunner's name for the stilt sandpiper (*Micropalama himantopus*) See STILT, and Plate of BEACH BIRDS

FROSTBITE A term usually applied to local effects of cold, although it may be properly used to designate all results of low degrees of temperature, from chapped hands to freezing to death (*asphyxia congelatorum*) The frostbitten part is at first pale, cold, tingling, and numb, then stiff, with loss of sensation and motion, later, shrunken, hard, even brittle, livid and mottled from coagulation of blood in the veins Molecular death occurs, the blood corpuscles disintegrate, sloughing and mortification result, and a line of demarcation is established (See GANGRENE) Although a sudden violent application of cold may cause death of the tissues by reducing the temperature to a degree incompatible with animal life, the most common cause of the destructive effects of moderate frostbite is perhaps the excessive reaction which occurs on sudden removal of the cold, or the application of heat, this is especially the case with moist cold

Most cases of frostbite are very trifling, the most common being chilblains (See CHAPPED HANDS, CHILBLAINS) The treatment of frostbite is best effected by friction, at first with snow, then with ice water, and then with water at ordinary temperature, no warmth being applied for some time. If the frozen part is brittle, spraying with ice water must be substituted for rubbing with snow As the coldness subsides, the painful tingling and then redness and heat return, in a short time the heat is above the normal, and a febrile reaction sets in Partial recovery may always be expected unless the freezing has been continued too long When sloughing begins, it is necessary to employ supportive and stimulative treatment, with hot fomentations or moist antiseptic dressings After the line of demarcation is established amputation should be performed Eczema and pruritus may follow moderate frostbite Partial paralysis of the parts supplied by the facial and radial nerves, or even hemiplegia, may follow The use of alcoholic drinks when one is exposed to cold is a fatal mistake The drug brings heat to the surface of the body, where it is rapidly lost, and the vitality of the individual is lowered Alcoholism predisposes to a fatal result in comparatively mild frostbite, from which temperate persons would quickly recover

FROST'BURG A town in Allegany Co., Md, 80 miles (direct) southeast of Pittsburgh, Pa, on the Western Maryland and the Cumber-

and and Pennsylvania railroads (Map Maryland, B 1) It is picturesquely situated at an elevation of about 2200 feet and is a summer resort It is the seat of a State normal school and contains a miners' hospital Frostburg has large fire-brick and tile works, planing mills, foundries, hosiery mills, etc, but is engaged chiefly in coal mining The government is administered under a charter of 1870, which provides for a mayor, chosen annually, and a city council elected at large The water works are owned by the municipality Pop, 1900, 5274, 1910, 6028

FROST'FISH 1 A slender, scaleless, pelagic fish (*Lepidotus caudatus*), elsewhere known as scabbard fish, but called frostfish in New Zealand, where it visits the coast to spawn at irregular intervals and is much sought after as a delicacy by a strange method of capture It has the extraordinary habit, in winter, of coming ashore alive on certain sandy beaches, where it wriggles on to the firmer sands above the surf line, there to die or be quietly devoured by some animal No satisfactory reason has yet been assigned for this suicidal proceeding, but it is taken advantage of by the "fisherman" When the night is clear and calm, with comparatively low surf, as well as frosty, the fish may be expected, and then parties of men go to the beach shortly before daybreak (or perhaps camp there overnight and rise early) and walk back and forth, seizing the fish as they come floundering out of the surf and killing them

2 In New England, a tomcod (q v)

FROTH FLY, FROTH-HOPPER, FROG FLY, or **FROGHOPPER** Insects of which the young—larvæ and pupæ—are found in a frothy exudation on plants They form the family Cercopidæ of homopterous bugs and are allied to aphids and still more nearly to cicadas and lantern flies The larvæ and pupæ differ little in appearance from the perfect insect, except that the latter possesses four large wings The froth, commonly called frog spittle, is believed to be composed of sap which the insect sucks up through its proboscis The sap passes through the intestine and is emitted as a clear mass, into which the insect draws bubbles of air by means of its tail claspers, and thus makes foam When the insect is about to transform, the foam dries in such a way as to produce a shelter for the ensuing quiescent stage The most common insect in the eastern United States is *Aphrophora quadrangularis* Some of the tropical forms assume very bizarre shapes, caused by outgrowths from the thorax The fluid is emitted by some species in drops which may be thrown a considerable distance, causing the phenomenon known as weeping trees A few dozen larvæ of a Madagascar form may exude a quart of fluid in an hour and a half Frog spittle is supposed to be produced as a protective covering for the young insect, but in spite of it certain Hymenoptera pick the larvæ out and carry them off to be stored as food for their larvæ The winged stage is a much flattened one and capable of long leaps, whence the name "froghopper," first given to them because they came from the frog spittle, is doubly appropriate

FROTHINGHAM, frŏth'ĭng-am, ARTHUR LINCOLN (1859–1923). An American archæologist and educator, born in Boston, Mass. He studied at the Catholic Seminary of San Apollinare, Rome, Italy, the Royal University of Rome, and the University of Leipzig (Ph D, 1883), was fellow in Semitic languages and lecturer in archæology at the Johns Hopkins University in 1882–86, in 1887 was appointed to the Princeton chair of archæology and the history of art, and in 1898–1906 was professor of archæology and ancient history In 1884 he was secretary of the Archæological Institute of America, in 1885 founded the *American Journal of Archæology*, of which he was owner and editor until 1896, and in 1895–96 was an associate director of the American School of Classical Studies at Rome His publications include contributions to periodicals, monographs on sculpture and painting, *Stephen Bar Sudaili, the Syrian Mystic and the Book of Hierotheos* (1886) with A Marquand, *A Text-Book of the History of Sculpture* (1896), *Monuments of Christian Rome* (1908), *Roman Cities in Italy and Dalmatia* (1910), *A History of Architecture* (1911) He prepared articles on architecture for the NEW INTERNATIONAL ENCYCLOPEDIA

FROTHINGHAM, ELLEN (1835–1902) An American translator, the daughter of Nathaniel Frothingham She was born in Boston She made a special study of German literature and is well known for her translations into English of Lessing's *Nathan der Weise* (1868), Goethe's *Hermann und Dorothea* (1870), Auerbach's *Edelweiss* (1871) and Lessing's *Laokoon* (1874)

FROTHINGHAM, NATHANIEL LANGDON (1793–1870) An American clergyman and writer He was born in Boston and in 1812 graduated at Harvard, where he became the first professor of rhetoric and oratory In 1815 he was ordained pastor of the First Church (Unitarian) in Boston, which position he occupied until 1850, when he devoted himself to literature He published *Sermons in the Order of a Twelvemonth* (1852) and *Metrical Pieces, Translated and Original* (1855, 1870) He translated Aratus' *Phænomena*, contributed largely to periodical literature, and was a thorough student of German, when such scholarship was rare in America His biography was written by his son, Octavius Brooks Frothingham, in the volume entitled *Boston Unitarianism, 1820–1850* (Boston, 1890)

FROTH'INGHAM, OCTAVIUS BROOKS (1822–95) An American Unitarian clergyman He was born in Boston, Nov 26, 1822, a son of Rev Nathaniel Langdon Frothingham He was graduated at Harvard College in 1843, at the Cambridge Divinity School in 1846, and was settled as pastor of the North Church (Unitarian), Salem, Mass, in 1847 In 1855 he became minister of a church in Jersey City, N J., where he remained four years In 1859 he accepted a call to the pastorate of the newly formed Third Unitarian Congregational Church in New York and remained at that post for 20 years, when ill health compelled his resignation From the beginning he belonged to the most radical wing of the Unitarians, and the name of his church was finally changed from the Third Unitarian to the First Independent Liberal Church of New York, the connection with the Unitarian denomination being thereby sundered After 1881 he resided in Boston and devoted himself to literary work He died Nov. 27, 1895 Frothingham was one of the founders of the Free Religious Association, and its president for the first 12 years of its existence He ranked high as a scholar, and as a preacher was impressive and eloquent He contributed largely to the peri-

odical press, on a great variety of subjects, and published more than 200 sermons Other works worthy of mention are A translation of Renan's *Studies of Religious History and Criticism* (1864), *Child's Book of Religion* (1866), *History of Transcendentalism in New England* (1876), *Boston Unitarianism, 1820–1850*, including a memoir of his father (1890), and lives of Theodore Parker (1874), Gerrit Smith (1878), George Ripley (1882), William Henry Channing (1886), and David Atwood Wasson (1889)

FROTHINGHAM, RICHARD (1812–80) An American journalist and historical writer, born in Charlestown, Mass He was a member of the State Legislature in 1839, 1840, 1842, 1849, and 1850, was mayor of Charlestown in 1851–53, was a delegate to the National Democratic Conventions of 1851, 1852, and 1876, and from 1852 to 1865 was managing editor of the Boston *Post*, of which he was also for many years a proprietor. He devoted much of his time to historical study, was treasurer of the Massachusetts Historical Society, and published, in addition to pamphlets and magazine articles, a *History of Charlestown* (1845–49), *History of the Siege of Boston* (1849), *Life and Times of Joseph Warren* (1865), *The Rise of the Republic of the United States* (1871), his most important work

FROTTOLA, frŏt'tō-la (It ballad) A kind of Italian folk song, much cultivated in the sixteenth century It was midway between the very simple villanella (q v) and the more elaborate madrigal (q v) Between 1504 and 1509 Petrucci published nine books of Frottole. The words were generally of an erotic character.

FROUDE, froōd, JAMES ANTHONY (1818–94). An English historian, littérateur, and educator The youngest son of Robert Hurrell Froude (1771–1859), Archdeacon of Totnes, he was born at Dartington, Devonshire, April 23, 1818 He was educated at Westminster School, and at Oriel College, Oxford, where in 1840 he obtained a second-class in classics and in 1842 graduated B A, won the Chancellor's prize for an English essay, and was elected a fellow of Exeter College He graduated M A in 1843 and to retain his fellowship took deacon's orders in 1845, which the Clerical Disabilities Act enabled him to relinquish in 1872 For, influenced by the Tractarian movement, of which his brother Richard Hurrell Froude and Newman were leaders, his views changed, and his early works, *The Shadows of the Clouds* (1847), published under the pen name of "Zeta," and the *Nemesis of Faith* (1848), being condemned by the university authorities, he resigned his fellowship, also an appointment as head master of the Hobart High School, Tasmania, abandoned the clerical profession, and devoted himself to historical study and literature He wrote for the *Westminster Review* and other periodicals, including *Fraser's Magazine*, of which he subsequently became editor, and in 1856 appeared the first two volumes of *The History of England from the Fall of Wolsey to the Defeat of the Spanish Armada* (12 vols, 1856–1870), on which his fame chiefly rests. In 1868 he was elected rector of St. Andrews University and received the degree of LL D The preparation and publication of his important historical and biographical works were relieved by intervals of travel and lecturing In 1872 his lectures in the United States on the relations between England and Ireland, in which, arguing from historical parallels, he scoffed at all attempts to conciliate the Irish, involved him in an animated controversy with the Dominican Father Thomas Burke In 1849 Froude married Charles Kingsley's sister-in-law, Charlotte Maria, fifth daughter of Pascoe Grenfell She died in 1860, and 17 months later he married Henrietta Elizabeth, daughter of John Ashley Warre Upon her death, in 1874, he resigned the editorship of *Fraser's Magazine*, and in 1874 and again in 1875 was sent by the Earl of Carnarvon, Secretary of State for the Colonies, to the Cape of Good Hope to investigate the plan of South African federation The result of these missions was singularly unfortunate and disastrous to Lord Carnarvon's policy, owing to Froude's tactless speeches and representations In 1884–85 he visited Australia and in 1886–87 the West Indies, he wrote accounts of these two visits, which were violently assailed by colonial writers as biased and misleading As Carlyle's personal friend and literary executor, he edited his *Reminiscences* (2 vols, 1881), Mrs Carlyle's *Letters and Memorials* (1883), and *Thomas Carlyle A History* (4 vols, 1882–84), but their copious personal criticism excited much discussion as to Froude's editorial discretion In 1892 he succeeded Edward A Freeman (q v), one of his most caustic critics, as regius professor of modern history at Oxford Froude died at Salcombe, Devon, Oct 20, 1894 Besides the works already mentioned, his writings include *The English in Ireland in the Eighteenth Century* (3 vols, 1872–74), *Short Studies on Great Subjects* (2 vols, 1877–82), *Cæsar* (1879), *Two Lectures on South Africa* (1880), *Oceana* (1886), *The English in the West Indies* (1888), *The Two Chiefs of Dunboy* (1889), an historical romance, *Life of Lord Beaconsfield* (1890), *Erasmus* (1894), *Elizabethan Seamen* (1895) Froude was afflicted with constitutional sentimentality and an unfortunate, if unconscious, facility for inaccurately adapting facts to suit the views he sought to promulgate His partisan glorification of Henry VIII as the disinterested and magnanimous executor of the public wish in regard to ecclesiastical reform is one of the most striking examples Hence the frequent storms of protest and criticism that his writings evoked, and the blemishes of his otherwise splendid works For although he at times subordinated accuracy to the exigencies of descriptive, vivid, and emphatic writing, and justified his action on the score of dramatic effect, the lucidity and beauty of his style make his works rank among the finest examples of English prose of the nineteenth century and have earned for his *magnum opus* an imperishable position in the chronicles of British history "The description of the setting sail of the Armada is an echo perhaps of Thucydides' account of the great Athenian fleet leaving the Piræus for Syracuse, but an echo so beautiful as amply to justify itself" Froude's life has been written by Herbert Paul (London, 1905), whose treatment without being definitely eulogistic is certainly conceived in a spirit of admiring appreciation Consult also Harrison, "Historical Method of Froude," in *Tennyson, Ruskin, Mill, and Other Literary Estimates* (New York, 1900), Bourne, *Essays in Historical Criticism* (ib, 1901), Cecil, *Six Oxford Thinkers* (London, 1909)

FROUFROU, froō'froō' A five-act comedy, the most celebrated work of Meilhac and Halévy, produced at the Gymnase in 1869

FROZEN STRAIT. A passage leading north-

west from Fox Channel, the northern continuation of Hudson Bay, to Rowe's Welcome (Map Canada, O 3) It separates Southampton Island from Melville Peninsula It is 15 miles wide and is nearly always icebound and inaccessible to navigation

FROZEN WELLS Wells in which ice is found either with or without water They occasionally occur in the United States and Europe A famous one in Brandon, Vt, was sunk through a mass of frozen ground 15 feet thick and formerly showed ice at 14 feet below the surface in the summer time In most frozen wells the ice lasts until late summer, and the temperature is seldom above the freezing point The low temperature and ice were originally attributed to the fact that the well pierces a stratum of glacier drift in which ancient glacier ice still survives, but the researches of Kimball have shown that this extreme hypothesis is quite unnecessary. He has demonstrated that the low temperatures in frozen wells, ice caves, and similar situations are due to the percolation of cold air into the interior of the earth during cold winter weather and the coldest hours of the morning He has shown that the deserted iron mines at Westport, N. Y, give a complete key to the method of formation of ice in caves and wells. Consult *United States Monthly Weather Review* (Washington, 1901). See ICE CAVES.

FRUCTIDOR, frŭk'tĭ-dôr' (Fr, from Lat. *fructus,* fruit, Gk. *δῶρον, dōron,* gift). The twelfth month of the French Republican calendar It ran from August 18 to September 16 in the years I–VII and from August 19 to September 17 in the years VIII–XIII, being followed by five supplementary days, known as sans-culottides, which filled out the year The 18th Fructidor, Year V (Sept 4, 1797), is celebrated as the day on which Barras, Rewbell, and La Révellière, members of the Directory, by a coup d'état, expelled their colleagues Carnot and Barthélemy and saved the Republic from the machinations of the party of reaction, who had obtained the upper hand in the Council of Five Hundred. See FRENCH REVOLUTION.

FRUCTOSE. See SUGARS

FRUGONI, froō-gō'nē, CARLO INNOCENZIO MARIA (1692–1768) An Italian poet, characteristic of the Arcadian school at the height of its development Born at Genoa, after many wanderings he settled down in Parma, under ducal protection, as tutor, court poet, director of the court theatre, and secretary of the Academy of Fine Arts. The verses he produced with extraordinary ease are marked by graceful superficiality and sensuous idealism Consult his *Opere poetiche* (10 vols, Parma, 1779), the *Poesie* (15 vols., Lucca, 1779–80), Carducci, *Poeti erotici del sec XVIII* (Florence, 1878), *Lettere inedite,* ed. by Bertoldi (Forlì, 1891), and others ed. by Mazzatinti (ib, 1892), the biography in Fabroni, *Vitæ,* vol i (1778–1805), Torelli, *Paesaggi e profili* (Florence, 1861), E. Bertana, "Intorno al Frugoni," in *Giornale storico della letteratura italiana,* vol xxiv (Torino, 1883–).

FRUIN, froin, ROBERT (1823–99). A Dutch historian, born in Rotterdam He was educated at Leyden, where he was appointed professor of the history of the Netherlands in 1860 He was editor of the *Nijhoff's Bijdragen voor Vaderlandsche Geschiedenis* and was a frequent contributor to *De Gids* and other publications He was regarded as the greatest living authority on Dutch history, and his work entitled *Tien jaren uit den tachtigjarigen oorlog* (4th ed, 1889) is considered one of the best historical works of modern times His *Reply to Sir Bartle Frere* and an *Appeal to the People of England* (1881), relative to the Transvaal question, created considerable comment Another of his publications is *Geschiedenis der staatsinstellingen in Nederland tot den val der republiek* (1901) His *Verspreide Geschriften* were published by Blok, P L Muller, and S Muller (8 vols, 1900–03)

FRUIT (OF, Fr. *fruit,* Lat *fructus,* fruit, from *frui,* to enjoy) The structure that ripens in connection with the seeds in the spermatophytes (seed plants). In popular application the term is also used in connection with the sporogonium of mosses and the sori of ferns (see FERN), but it is misapplied in these senses The structures of seed plants included in the fruit are exceedingly variable. In typical cases the fruit is the ripened ovary, as in ordinary pods, the transformed wall being called the pericarp, in apples it includes floral structures outside of the ovary, in strawberries it consists in the main of a very much enlarged receptacle, while in pineapples it is the whole inflorescence So variable are fruits in structure that it is difficult to classify them satisfactorily, and it is not profitable to give a complete list of the numerous and often pedantic terms which have been applied to them. It will be sufficient to describe the principal forms. It seems to be most convenient to divide fruits into two great divisions, dry fruits and fleshy fruits

Dry Fruits. Dry fruits either open (dehisce) in various ways to discharge their seeds, or they contain but a single seed, which accompanies the fruit in the dispersal The dry fruits therefore naturally fall into two groups (1) those which are dehiscent, and (2) those which are indehiscent Such fruits also consist of the ripened ovary and therefore have a strict morphological boundary (1) *Dehiscent fruits* have received the general name of pods and are grouped on the basis of the number of carpels they contain and the method of dehiscence The prominent forms are as follows *Follicle,* a pod consisting of a single carpel and dehiscing by splitting down the inner side, as in the peony *Legume,* a pod consisting of a single carpel and dehiscing by splitting down both sides into two pieces or valves, as in the common pea and bean Very frequently legumes are simply spoken of as pods, and they are so characteristic of the great pea family that it has been called the Leguminosæ *Capsule,* a pod consisting of more than one carpel and dehiscing variously The dehiscence is said to be septicidal when the carpels separate from one another, and in such case each carpel may split down the inner face as if it were a follicle, as in the genus *Hypericum* In other cases the carpels do not separate, but each one splits down the back, such dehiscence being called loculicidal, as in iris, evening primrose (*Œnothera*), etc In still other cases there are no slits of dehiscence, but the seeds are discharged through porelike openings near the summit of the capsule, as in the common poppy *Silique,* the peculiar pod of the mustard family (Cruciferæ), which consists of two carpels and is divided into two chambers by a false partition, to which the seeds are attached In dehiscence the two carpels split away as two valves from the membranous partition, which is thus exposed with its attached seeds *Silicle,*

a short silique, which is little if at all longer than broad, as in the common shepherd's-purse (*Capsella*) *Pyxis*, a pod which opens by means of a caplike lid, as in twinleaf (*Jeffersonia*)

(2) *Indehiscent fruits* mature but a single seed, although they are often derived from an ovary composed of more than one carpel, and the pericarp so closely invests the seed that such fruits are popularly spoken of as seeds Common illustrations are as follows *Achene*, or *Akene*, the most common seedlike fruit, characteristic of the great family Compositæ, to which belong the sunflowers, thistles, dandelions, etc In this family the achene commonly bears at its summit the modified calyx (pappus), which in the form of a tuft of hairs or plumes, bristles, hooks, etc, aids in dispersal by wind or animals *Caryopsis*, or *Grain*, the peculiar seedlike fruit of the grasses, as maize, wheat, barley, rice, etc *Nut*, a dry indehiscent fruit, in which the pericarp becomes very hard and bony, as in the acorn, chestnut, beechnut, etc Very commonly there is associated with the nut a peculiar involucre, as that which forms the cup of the acorn and the characteristic investment of chestnuts and beechnuts

Fleshy Fruits Fleshy fruits are indehiscent, since the flesh is intimately associated with the seeds in their dispersal It is these fruits which are so variable on account of the different structures which ripen The most common forms are as follows *Berry*, a fleshy fruit, which is pulpy throughout, and which has a thin skin, or rind In this case the fruit is a ripened ovary, and common examples are the grape, currant, gooseberry, tomato, etc *Hesperidium*, a berry with a leathery rind, as the orange and lemon *Pepo*, a pulpy fruit with a hard rind, as the pumpkin, squash, melon, and the whole race of gourds *Drupe*, or *Stone fruit*, in which the pericarp ripens in two layers—an outer pulpy one and an inner stony one, as the peach, plum, cherry, etc In these cases the pit, or stone, is often spoken of as the seed, but it invests the seed, which is the kernel *Drupelet*, a small drupe, as the individual grains of raspberry, blackberry, mulberry, etc Drupelets are usually aggregated to form a single fruit, as in the illustrations cited In the raspberry the fruit is simply an aggregation of drupelets, while in the blackberry and mulberry there is associated with the aggregation of drupelets a fleshy axis *Pome*, a fleshy fruit in which the pulp is the ripened urnlike outgrowth which surrounds the carpels and bears the sepals, petals, and stamens on its rim Common illustrations are apple, pear, quince, hawthorn, etc In these cases the modified ovary is the so-called core

While this classification is fairly complete, it does not include some of the most familiar fruits For example, the strawberry is a fruit which consists of a very much enlarged and fleshy receptacle, in which are embedded numerous minute achenes (pits) The banana is a fleshy fruit, but it dehisces by the pericarp splitting into valves, and hence it is often called a fleshy capsule, which is really a contradiction of terms Almonds are dry fruits, but they are constructed exactly like the peach, except that the pulpy layer of the pericarp in the peach is a fibrous layer in the almond The almonds of the markets correspond to the stone of the peach, being the hard inner layer of the pericarp, investing the seed or edible kernel. The pineapple is a whole inflorescence, in which axis, bracts, flowers, and all have become a mass of luscious pulp

Fruits, Food Value of Fruits are eaten fresh, both raw and cooked, dried or evaporated, canned and preserved They are frequently divided into a number of classes, the edible fruits being mostly pomes, e g, apple, pear, etc, stone fruit, e g, cherry, plum, etc, berries, e g, blueberry, grape, currant, etc, aggregate fruits, e g, strawberry, raspberry, pineapple, etc, hesperidium, e g, orange, grapefruit, lemon, etc, syconium, e g, fig A large class of edible fruits, such as tomatoes and melons, are more commonly spoken of as vegetables (q v), and another as nuts (q v) The accompanying table gives the composition of the more common fresh fruits as well as of a number of dried or evaporated and canned or preserved fruits

These figures represent average values, individual specimens will vary greatly from the average Many fruits contain more or less inedible material or refuse, such as stems, seeds pit, etc, while others are entirely edible The inedible portion may be considerable, thus, in oranges the skin and seeds amount to about 27 per cent In bananas the skin constitutes about 35 per cent of the fruit as purchased On the other hand, the inedible portion may be very small Thus, the pits of cherries or the hulls of strawberries constitute about 5 per cent of the weight of the fruit It will be seen in general that fruits have a high water content Carbohydrates, which include starches, sugars, and similar bodies, make up the principal nutritive material Pectin is an important carbohydrate constituent of fruit To it is due the jelly-making quality which so many fruits possess, particularly when green or underripe Pectin, with acid, sugar, and a relatively large amount of water, has the property of setting, or jellying In general, fruits contain very little protein or fat An exception is the avocado or alligator pear, which contains about 10 per cent of fat The ash content of fruits is small However, mineral matter is important in the diet, and fruit is a valuable source of it The ash is made up of salts of calcium, potassium, magnesium, sodium, etc For instance, the ash of one sample of cherries (which constitutes about 0 6 per cent of the total fruit) contained 4 2 per cent of calcium oxide, 57 7 of potassium oxide, 5 5 of magnesium oxide, 15 1 of phosphoric acid, 6 8 of sodium oxide, and 5 8 of sulphuric acid The ash of three samples of figs (also constituting some 0 6 per cent of the total fruit) contained an average of 2 4 per cent of calcium oxide, 55 8 of potassium oxide, 5 6 of magnesium oxide, 12.4 of phosphoric acid, and 3 9 of sulphuric acid In the ash of five samples of grapes (which made up 0 5 per cent of the fruit) there was an average percentage of 5 calcium oxide, 50 9 potassium oxide, 3 magnesium oxide, 21 2 phosphoric acid, and 4 3 sulphuric acid

Dried or evaporated fruits contain much more nutritive material in proportion to their bulk than do the fresh fruits, owing to the fact that, like other dried foods, they have been concentrated by evaporation Canned or preserved fruits are, generally speaking, cooked fruits, with or without the addition of sugar Fruits owe their flavors to the presence of esters, acids, volatile oils, salts, and other chemical bodies The coloring is due to the presence of erythrophyll and other complicated chemical compounds

In food analysis such materials are not estimated separately The total amount is not large, and such bodies are generally included under the carbohydrates, or, as the most important part of the group is termed, the nitrogen-free extract The flavor, appearance, and composition of fruits may be modified by cultivation

A few experiments have been made regarding the digestibility of fruits, i e, the amount of material which they give up in their passage through the digestive tract The results indicate that they are quite thoroughly assimilated Overindulgence in fruit and the consumption of unripe fruit or of that which is more or less decayed, frequently cause pain or other unpleasant symptoms, and there are persons who because of personal idiosyncrasy cannot eat certain fruits without distress Judging by the results of a large number of dietary studies made in the United States, fruits furnish about 1 per cent of the total food, 5 6 per cent of the total carbohydrates, and 4 9 per cent of the total protein and fat taken together

In many dietary studies which have been made the cost of foods has been recorded It has been found that a large consumption of fruits or fresh vegetables, owing to their low food content, increases the cost of the diet out of proportion to the nutritive material furnished It must not be forgotten, however, that fruits have value in addition to their nutritive value They contain salt, acids, and other bodies which are believed by physiologists to have a beneficial effect on the system, and doubtless very often they stimulate the appetite for other food They are also useful in counteracting a tendency to constipation

Another point—and one entirely apart from food value—should not be overlooked, i e, fruits add very materially to the attractiveness of the diet It is not easy to estimate their value from this standpoint, since often the appearance of food has a value which cannot be measured in dollars and cents For bibliography, see separate articles on various kinds of fruits See also FOOD PRESERVATION, and consult "Use of Fruit as Food," *United States Department of Agriculture, Farmers' Bulletin, No 293* (1911), "Raisins, Figs, and Other Dried Fruits and their Use," *United States Department of Agriculture, Yearbook 1912*, Bailey, *Sketch of the Evolution of our Native Fruits* (New York, 1898)

COMPOSITION OF EDIBLE PORTION OF FRUITS, FRESH, DRIED, AND PRESERVED

FRUITS	Water	Protein	Fat	Carbohydrates	Ash	Fuel value per pound
FRESH	%	%	%	%	%	*Calories*
Avocado or Alligator pear	81 1	1 0	10 2	6 8	9	512
Apple	84 6	4	5	14 2	3	290
Apricot	85 0	1 1		13 4	5	270
Banana	75 3	1 3	6	22 0	8	460
Blackberry	86 3	1 3	1 0	10 9	5	270
Cherry	80 9	1 0	8	16 7	6	365
Cranberry	88 9	4	6	9 9	2	215
Currant	85 0	1 5		12 8	7	265
Fig	79 1	1 5		18 8	6	380
Grape	77 4	1 3	1 6	19 2	5	450
Huckleberry	81 9	6	6	16 6	3	345
Lemon	89 3	1 0	7	8 5	5	205
Nectarine	82 9	6		15 9	6	305
Orange	86 9	8	2	11 6	5	240
Pear	84 4	6	5	14 1	4	295
Persimmon	66 1	8	7	31 5	9	630
Pineapple	89 3	4	3	9 7	3	200
Plum	78 4	1 0		20 1	5	395
Pomegranate	76 8	1 5	1 6	19 5	6	460
Prune	79 6	9		18 9	6	470
Raspberry, red	85 8	1 0		12 6	6	255
Raspberry, black	84 1	1 7	1 0	12 6	6	310
Strawberry	90 4	1 0	6	7 4	6	180
Whortleberry	82 4	7	3 0	13 5	4	390
DRIED						
Apple	28 1	1 6	2 2	66 1	2 0	1 350
Apricot	29 4	4 7	1 0	62 5	2 4	1,290
Citron, candied	19 0	5	1 5	78 1	9	1,525
Currant, Zante	17 2	2 4	1 7	74 2	4 5	1,495
Date	15 4	2 1	2 8	78 4	1 3	1,615
Fig	18 8	4 3	3	74 2	2 4	1,475
Pear	16 5	2 8	5 4	72 9	2 4	1,635
Prune	22 3	2 1		73 3	2 3	1,400
Raisin	14 6	2 6	3 3	76 1	3 4	1,605
Raspberry	8 1	7 3	1 8	80 2	2 6	1,705
PRESERVED						
Apple, crab, canned	42 4	3	2 4	54 4	5	1,120
Apricot, canned	81 4	9		17 3	4	340
Blackberry, canned	40 0	8	2 1	56 4	7	1,150
Fruit jelly	21 0			78 3	7	1,415
Grape juice	79 2	2		20 3	3	370
Orange marmalade	14 5	6	1	84 5	3	1,585
Peach, canned	88 1	7	1	10 8	3	220
Pineapple, canned	61 8	4	7	36 4	7	715

FRUIT, CULTIVATED Cultivated fruits exhibit great diversity of form, color, texture, flavor, and keeping quality All are intimately associated with the flower which precedes their formation, and all find their chief use as food for man. The plants that produce them are adapted to great diversity of climate and soil,

and may be divided into three main groups—tropical, subtropical, and temperate—depending upon the temperature they require for their perfect development The leading fruits of the tropics are date, banana, coconut, and pineapple, of the subtropics, orange, lemon, fig, pomelo, of the temperate, apple, grape, plum, olive, peach, pear, cherry, strawberry All of these contribute largely, not only to the diet of the resident populace, but through export, in either the fresh or the preserved state, to the prosperity of the region in which they grow.

The present commercial importance of cultivated fruits is largely due to the developments of the latter half of the nineteenth century Prior to that period few fresh fruits other than apples, lemons, oranges, and coconuts, and such dried fruits as figs, raisins, and prunes, could be obtained for more than a few consecutive weeks in the general markets of the world, their perishable nature precluding long shipment and exposure previous to sale During that period the great advances made in quick transportation by sea as well as by land, and the remarkable improvements wrought in methods of canning and evaporating and in holding fresh fruits in edible condition by means of cold storage, have had a wider influence in extending the area devoted to cultivated fruits than improvements in the fruits themselves or in the methods of cultivation Improved methods of preservation and expeditious transportation have enabled fruit growers throughout the world to educate the taste and create a demand for fruits in remote regions, with the result that the number of cultivated and even of important wild edible fruits not found either fresh or preserved in the world's principal markets is small indeed and is becoming steadily smaller America and Australia ship apples, pears, canned and dried fruits to Europe, which reciprocates by exporting figs, raisins, and the seedless grapes known in commerce as currants, California sends grapes and raisins, citrous fruits, fresh and canned peaches, pears, cherries, and apricots to the States east of the Rocky Mountains, the States bordering the Gulf of Mexico send citrous fruits to the North, as well as strawberries, peaches, and other perishable fruits before the Northern season opens, the tropics export bananas, coconuts, and pineapples to markets in the temperate zones Apples, lemons, bananas, and oranges may now be obtained in a fresh state throughout the year, and many other fruits, such as pears, strawberries, grapes, and peaches, that could be obtained for only a few weeks, have had their seasons extended in some instances to as many months. Fruit, fresh or preserved, domestic or exotic, is so generally included in the daily diet of the people of all civilized countries, and the extension of plantations in every country visited by commerce is so active, that the world may be said to be in its fruit age Fruits now form an important factor in international trade The imports of fruits into the United States in the fiscal year 1914 were valued at $33,600,000, and the exports at $31,030,000

If the standing of fruits be determined by the area devoted to each, the consumption of each, and the variety of fruit products of each, the order of sequence in a list of the world's cultivated fruits and their products would probably not vary greatly in a series of years from the following apple (evaporated, butter, marmalade, jelly, cider, vinegar, wine, champagne, brandy), grape (wine, juice, vinegar, jelly, argols, or dried as raisins or currants), olive (pickled, oil), lemon (candied, extract, citric acid), orange (cider, marmalade, candied), coconut (dried, oil), banana (evaporated), peach (canned and dried), plum (canned or dried as prunes), pear (canned, perry), date (dried), fig (dried), strawberry (canned jam), pineapple (canned), cherry (canned, dried, and candied) If commercial standards, quantity and variety of product, and quick precision in applying scientific discovery and business acumen to fruit growing and marketing, be employed to determine the standing of a country with respect to its cultivated fruits, the United States stands without a peer, and among the continents North America ranks first Immigrants from Europe, who brought with them the fruits of the fatherland, found the land of their adoption to be rich in new kinds of fruits The dual list begun by them has been swollen by importations from other regions—Asian, African, Australian, and South American—and now far exceeds in number of species that of any other country All the fruits of the northern temperate zone, many of the southern and the subtropical, and a few peculiarly tropical may be found in some region of the United States Europe contributed the apple, pear, and cherry, Asia, the peach, plum, orange, fig, and coconut, Africa, the date, South America, the navel orange, and so on America has developed many varieties of the following indigenous fruits which she offers in exchange viz, blackberry, raspberry, cranberry, dewberry, grapes, and some gooseberries, plums, and apples, besides innumerable improvements in species already highly developed abroad Yet she has scarcely made more than a beginning, many fruits, such as the persimmon, papaw, buffalo berry, and prickly pear, have as yet attracted only temporary interest, but are acknowledged by horticulturists to be rich in promise of possible amelioration But this remark is true also of fruits of other regions, especially of fruits indigenous to the tropics.

Apart from the business side of fruit growing already touched upon, the improvements made in the fruits themselves and in fruit culture during the last half of the nineteenth century have resulted mainly from the application of scientific discoveries in plant life These discoveries and the improvements based upon them may be divided into three general groups ecological (the influence of temperature, moisture, wind, air, drainage, soil); physiological (manuring, tilling, mulching, pollenizing, thinning, pruning, hybridizing, and selecting), parasitical and pathological (the control of animal and plant parasites) Concerning these, see MANURES AND MANURING, ECOLOGY, DISTRIBUTION OF PLANTS, TILLAGE, PLANT BREEDING, PRUNING, MULCH, POLLINATION, CROSS-FERTILIZATION, FUNGI, ECONOMIC, FUNGICIDE, INSECTICIDE, HARVEST AND HARVESTING, IMPLEMENTS, AGRICULTURAL, WINDBREAK, REFRIGERATION, and articles on the various fruits Consult also Bailey, *Principles of Fruit-Growing* (New York, 1897), *Standard Cyclopedia of Horticulture* (ib, 1914–15), Goff, *Lessons in Commercial Fruit Growing* (Madison, 1902); Thomas, *American Fruit Culturist* (21st ed, New York, 1903), Maynard, *Successful Fruit Culture* (ib, 1905); Turner, *Fruits and Vegetables under Glass* (ib, 1912), Green,

Popular Fruit Growing (4th ed, St Paul, 1912)

FRUIT, FOSSIL See CARPOLITH

FRUIT BAT Any fruit-eating bat, especially of the Old World tropical family Pteropodidæ, called fox bats, or flying foxes These constitute a suborder, Megacheiroptera, of the bats, based not only upon their large size, but upon distinctive structural features The wings of fruit bats have three, instead of one or two, joints in the second, or index, finger, which is generally provided with a claw, while the thumb alone of other bats possesses one The ears are small, lack any inner tragus, and the conch forms a ring at its base, the tail, when present, is short, and beneath and free from the membrane between the hind legs The teeth are unlike those of ordinary bats, particularly in the molars having elongated flat crowns, adapted to crushing pulpy fruits, such as the fig and banana, which constitute nearly the entire diet of the group These bats are regarded as a specialized offshoot from the ordinary type of insectivorous bats Consult Thomas, *Proceedings of the Zoological Society of London* (London, 1888) See FOX BAT, HARPY BAT, TUBE NOSE

FRUIT CROW A name for several South American birds of the family Cotingidæ and the genera *Gymnocephalus* and *Gymnodera* They are closely related to the bell birds and umbrella birds (q v), are crowlike in appearance, and feed upon fruits to a great extent They possess the baldness or tendency to wattles which characterizes the group, and one or more prominent species are known as baldheads

FRUIT FLY Any small fly of the family Trypetidæ They are very numerous and include many species which injure fruit and others that make galls Most of them are minute, and all are marked with varied colors and spots Prominent examples are *Trypeta pomonella,* whose larva, the apple maggot, bores tunnels in apples Another species, *Ceratitis capitata,* is highly injurious to peaches in the Old World, but is not met with in America The Morelos orange worm (see ORANGE INSECTS) of Mexico is of this family, and others might be named Consult Loew, *Monographs of the Diptera of North America,* parts i and iii (Washington, 1862–73), and Coquillett, "Descriptions of Trypetidæ," in *Journal of the New York Entomological Society* (New York, 1899) See GALL INSECTS

FRUIT PIGEON. A pigeon of the family Treronidæ They have the bill considerably depressed at the base, compressed and moderately arched at the tip, the membrane in which the nostrils are pierced little prominent or swollen, the forehead low, and the feathers advancing on the soft part of the bill, the wings moderately long, the feet, and particularly the hinder claw, large, and formed for grasping During the breeding season a curious gristly knob grows on the base of the upper mandible of some of the species and soon after disappears They are birds of splendid plumage, natives of the forests of India, the Indian Archipelago, the warmer parts of Australia, the islands of the Pacific Ocean, and one species is found in Africa There are over 200 species in the family. Their food consists of fruits, which are swallowed whole

FRUIT SUGAR. See SUGARS

FRUMENTIUS, froo-mĕn'shĭ-ŭs, SAINT (c.300–c 380) The apostle of the Abyssinians About 316 he and his brother Edesius, both young boys, accompanied their uncle Meropius, a Greek philosopher of Tyre, on a trading voyage, or, according to others, a scientific expedition Landing on the coast of Abyssinia, all were slain by the natives except the two boys, who became slaves in the service of the King They won the confidence of their master, were raised to important positions, and ultimately were set free After the death of the monarch Frumentius became instructor to the young Prince Aizanes and obtained great influence in the administration of state affairs He formed a church of native converts and Christian merchants who came to the country After the Prince attained his majority Edesius returned to Tyre and became a presbyter Frumentius went to Alexandria and informed Athanasius, who had lately been nominated Bishop, of the progress he had made in preparing the way for Christianity in Abyssinia and was consecrated Bishop of Axum (328). After his return he baptized the King and made many converts He is supposed to have translated the Bible into Ethiopian Frumentius' day is celebrated by the Latins on October 27, by the Greeks on November 30, and by the Abyssinians on December 18 The chief authority for his life is the Church historian Rufinus See ABYSSINIAN CHURCH

FRUNDSBERG, frunts'bĕrk, or **FRONSPERG,** frôns'pĕrk, GEORG VON (1473–1528) A German soldier He was born at the castle of Mindelheim, Swabia, and received his military training in the wars of the house of Hapsburg against Switzerland and in the Italian campaign between the League of Cambria and Venice. In 1519 he was appointed commander in chief of all the infantry troops of the Swabian League He fought with distinction at the battle of Pavia (1525) He was called "the Father of the German *Landsknechte*" (or pikemen) because of the help he rendered Maximilian in organizing and developing this military body, which continued to take a prominent part in European campaigns until the termination of the Thirty Years' War Consult the biography of him and his son Kaspar (1500–36) by Adam Reissner (in Latin, Frankfort, 1568, German, 1572), and Barthold, *Georg von Frundsberg* (Hamburg, 1833)

FRUSINO See FROSINONE

FRUS'TUM. See CONE

FRY, SIR EDWARD (1827–1918) An English jurist, born at Bristol and educated at the college there and at University College, London He was called to the bar in 1854, was appointed judge of the High Court (Chancery Division) in 1877, was judge of the Court of Appeal from 1883 to 1892, and in 1897 was president of the Royal Commission on the Irish Land Acts In 1906 he became president of the Royal Commission for Inquiring into the State of Higher Education in Ireland He was arbitrator in many local and international cases, becoming a member of the Permanent Court of Arbitration at The Hague in 1901, and in 1907 was British Ambassador to The Hague Peace Conference His writings, which were chiefly on law and botany, include *Essays on the Accordance of Christianity with the Nature of Man* (1857), *A Treatise on the Specific Performance of Contracts* (1858, 5th ed., 1911), *British Mosses* (1892), a life of James Hack Tuke (1899), *The Mycetozoa* (1899), *Studies by the Way* (1900); *The Lwerworts* (1911).

FRY, ELIZABETH (1780–1845). An English

philanthropist and prison reformer, born at Norwich, Norfolk, daughter of John Gurney, a banker and member of the Society of Friends. As a child of 15, she became deeply interested in the house of correction at Norwich In 1813 she first became practically engaged in prison reform and turned her attention to the condition of women prisoners at Newgate Under her leadership an association was formed in 1817 for the improvement of these unfortunates and did much to better their condition materially and morally Mrs Fry also joined in the movement to induce the government to make proper regulations for the voyage of convicts, at that time transported to New South Wales, and to make provision for their employment at the end of their voyage She extended her activities throughout England, traveled from place to place, and founded prison associations Her work attracted attention in other countries also and contributed materially to prison reform on the Continent She wrote several works of minor importance For the story of her life, consult the *Memoirs*, ed by her two daughters (2 vols, London, 1847), *Memoirs*, by Thomas Timpson (ib., 1847), a *Life*, compiled from her journal by Susanna Corder (ib, 1853)

FRY, JAMES BARNET (1827–94). An American soldier He was born in Carrollton, Ill, graduated at West Point in 1847, served for a time as assistant instructor of artillery there, was stationed successively in Oregon, Louisiana, and Texas, was instructor at West Point in 1853–54, and was adjutant of the Academy from 1854 to 1859 In 1861 he acted as chief of staff to General McDowell In 1862 he held a similar position under General Buell He was then provost marshal general of the United States from March, 1863, until August, 1866, when this office was abolished He subsequently served as adjutant general and was successively brevetted colonel, brigadier general, and major general He published· *A Sketch of the Adjutant-General's Department, United States Army, from 1775 to 1875* (1875), *History and Legal Effects of Brevets in the Armies of Great Britain and the United States, from their Origin in 1692 to the Present Time* (1877), *Army Sacrifices* (1879), *Operations of the Army under Buell* (1884), *McDowell and Tyler in the Campaign of Bull Run* (1884), *New York and Conscription* (1885), *Military Miscellanies* and *The Conkling and Blaine-Fry Controversy in 1866* (1893)

FRYE, ALEXIS EVERETT (1859–) An American geographer, born at North Haven, Me He graduated from the Cook County Normal School, Chicago (1885), and from Harvard Law School (1890), taught in the Chicago Normal School (1883–86), lectured on educational topics (1886–90), was superintendent of schools at San Bernardino, Cal (1891–93), and traveled in Europe, Asia, and Africa in 1897 He served as captain of the Harvard Graduates' Company in the Spanish War in 1898 and as lieutenant of the First Massachusetts Artillery in 1898–99 While superintendent of schools of Cuba (1899–1901) he organized the public-school system of the island and conducted the Cuban teachers' expedition to the United States in 1900 In 1904–06 he was president of the National Teachers' Association of Cuba His most important books are a large number of excellent and widely used school geographies

FRYE, WILLIAM PIERCE (1831–1911). An American legislator, born in Lewiston, Me He graduated at Bowdoin College in 1850, and after studying law in the office of William Pitt Fessenden, practiced at Rockford and later at Lewiston He was a member of the State Legislature in 1861–62, was a presidential elector on the Lincoln ticket in 1864, and was again a member of the Legislature in 1866–67, serving at the same time as mayor of Lewiston He was Attorney-General of the State from 1867 to 1869. Elected in 1871 to the national House of Representatives, he was reelected five times, resigning his seat in 1881 to fill the vacancy in the United States Senate caused by J G Blaine's resignation He was elected for the full term in 1883, and was reelected in 1889, 1895, 1901, and 1907 He was elected president pro tempore of the Senate in 1896 and was the permanent presiding officer of that body after the death of Vice President Hobart, in 1899, and again after the elevation of Vice President Roosevelt to the presidency in 1901 In 1898, after the close of the Spanish War, Senator Frye was a member of the Peace Commission at Paris He had a great influence on national legislation, as chairman of the Committee on Commerce he framed the legislation and proposed legislation in regard to American shipping

FRYER, JOHN (1839–) A promoter of education in China He was born at Hythe, Kent, England, and graduated at Highbury College, London, in 1860 He was principal of St Paul's College, Hongkong, China (1861–63), professor of English at Tung-Wên College, Peking (1863–65), and head master of the Anglo-Chinese School, Shanghai (1865–67) From 1867 to 1896 he had charge of the translation of foreign scientific books into Chinese at the Imperial Government Arsenal in Shanghai He served as an examiner of the Imperial Naval College at Nanking in 1894–95, founded and from 1884 to 1911 was proprietor of the Chinese Scientific Book Depot, Shanghai, and also founded the Institution for Chinese Blind at Shanghai in 1911. He published more than 100 books in Chinese, and also *Educational Directory for China* (1895), *Translator's Vade-Mecum, or Vocabulary of Scientific Terms in Chinese and English, Admission of Chinese Students to American Colleges* (1909)

FRYING See COOKERY

FRYKEN, fru'ken A series of small lakes in the southern part of Sweden, north of Lake Wenern, into which their waters flow They are arranged in three main groups, are connected by narrow channels, the whole forming a river of irregular width, and are famed for their beautiful scenery

FRYTH, JOHN See FRITH

FRYXELL, fruk-sĕl', ANDERS (1795–1881) A Swedish historian He was born at Hesselskog in Dalsland, and after studying at the University of Upsala and taking holy orders, became in 1819 instructor at the Djurgårdskole in Stockholm, from which he went in 1822 to the Maria-Skole in the same city From 1828 to 1836 he was rector of that institution In 1824 he published his Swedish Grammar, the only one used for a long period of time His interest lay chiefly in questions of public education In 1835 he became pastor at Sunne, and in 1836 Bishop of Northern Wermland From 1847 till his death, March 21, 1881, he devoted himself exclusively to historical research. His great work is the *Berattelser ur Svenska historien,*

'Contributions to Swedish History' (46 vols, 1823–79), dealing with the history of his country till 1771 These narratives are marked not only by their patriotic sentiment, but by their fresh and natural conception, their richness of biographic detail, and their naive and vivacious style They possess, too, the faults of their kind, and have been criticized for their diffuseness and lack of critical insight The *Berattelser* have nevertheless become a national classic His *Characteristics of the Period from 1592 to 1600 in Sweden* (1830) received the grand prize of the Swedish Academy Between 1845 and 1850 he published *Om aristokrat-fordomandet i Svenska historien*, 'The Rôle of the Aristocracy in Swedish History' This was in the nature of a defense of the Swedish nobility, and brought upon him the hatred of the Liberal element in Sweden Fryxell's minor works include *Handlingar rorande Sveriges historia*, 'Studies in Swedish History' (1836–43), and *Bidrag till Sveriges litteratur-historia*, 'Contributions to the History of Swedish Literature' (1860–62) His autobiography, *Min historias historia*, appeared at Stockholm in 1884 It was written by his daughter, but from his own manuscripts.

F 'S AUNT, MR A character in Dickens's *Little Dorrit* She was left to Mrs F by her husband as a not very acceptable legacy

FTELEY, ALPHONSE (1837–1903) An American hydraulic engineer, engaged chiefly on the construction of municipal water works He was born in Paris, France, in April, 1837 After serving in several European engineering offices, he came to the United States in 1865 and for a year was a mechanical draftsman on marine steam engines From 1866 to 1870 he assisted William E Worthen, an eminent civil engineer of New York City He then opened an office as a civil engineer In 1873 he became resident engineer in charge of investigation and construction of the Sudbury River water works of the city of Boston, under Joseph P Davis, then city engineer of Boston, and from 1880 to 1884 he was chief assistant engineer of Boston Then began his long and important connection with the Croton Aqueduct Commission on increasing the water supply of New York City by means of the new Croton Aqueduct and the new Croton Dam (see AQUEDUCT, DAMS AND RESERVOIRS) In 1884 he became principal assistant engineer of the commission, from 1884 to 1886 he was consulting engineer, and he was chief engineer from 1886 until ill health led to his resignation in 1899 From time to time he was consulting engineer on water-supply additions to many cities, including Brooklyn, Cincinnati, Albany, and Rochester, on sewerage for Brooklyn, Newark, Hoboken, and the Passaic Valley Sewerage District (N J), on the lining of the Hoosac Tunnel, and on rapid transit in Boston and New York He was elected a member of the American Society of Civil Engineers in 1876, was president in 1898, and contributed to the *Transactions* of the society

FUAD PASHA, foo'ad pâ-sha' (1814–69) A Turkish statesman and scholar, born in Constantinople He was the son of the poet Izzet Mollah and nephew of Leila Khatun, one of the very few Turkish poetesses He studied medicine at Galata-Serai from 1828 to 1832 In 1834 he was appointed Admiralty physician and accompanied the Grand Admiral in his expedition against Tripoli On his return to Constantinople he forsook medicine and entered the Bureau of Interpreters for the Porte In 1840 he became First Secretary to the Turkish Embassy at London and served in various diplomatic positions until in 1848 he was appointed Grand Interpreter to the Porte In 1850 he went on a mission to St Petersburg and in 1853 on another to Egypt On his return from the first of these he became Minister of Foreign Affairs under the grand-viziership of Ali Pasha In 1854 Fuad went to Epirus along with Omer Pasha, where he suppressed the insurrection with great energy In the following year he received the title of Pasha and was again appointed Minister of Foreign Affairs, and represented Turkey at Paris in the regulation of the affairs of the Danubian Principalities In 1860 he was sent to Damascus in consequence of the disorders in the Lebanon (See DRUSES) In 1861 he held the office of Grand Vizier. In 1862 he became Minister of Finance and in 1867 again Minister of Foreign Affairs He died in 1869 When the Turkish Academy of Science and Belles-Lettres was established, in 1851, Fuad became one of the first members, and in the following year he published a Turkish grammar, which is highly esteemed by native scholars. He also wrote a poem on the Alhambra He received many honors and decorations from European sovereigns

FUCA See JUAN DE FUCA, STRAIT OF

FUCA, foo'ka, JUAN DE (?–1602) A Greek navigator, whose real name was Apostolos Valerianos He was born in Cephalonia and in 1596 told Michael Lok, an Englishman, that in 1592 he had found the Straits of Anian connecting the Pacific with the Atlantic This story appeared in *Purchas, His Pilgrimes* (1625, vol iii, pp 849–852) and stimulated search for a passage between the two oceans In 1788 Meares, discovering a great inlet on the northwest coast of North America, called it the Strait of Juan de Fuca, and the name is still used for the channel from the Gulf of Georgia Most of the details of his story as reported by Lok seem false For criticism of his claims, adverse, consult Bancroft, *History of the Northwest Coast*, vol i, chap 3 (1884)

FUCHAU, foo'chou' See FOOCHOW.

FUCHOW See FOOCHOW

FUCHS, fuks, ERNST (1851–) A German ophthalmologist He was born and educated at Vienna, and after holding a professorship at the University of Liége (1881–86) was appointed to the chair of ophthalmology at the University of Vienna. His principal publications, most of which are translated into English and French, include *Das Sarcom des Uvealtractus* (1882), *Die Ursachen und die Verhutung der Blindheit* (1885), *Lehrbuch der Augenheilkunde* (1889; 11th ed, 1907, Eng trans by Alexander Duane under the title *Text-Book of Ophthalmology*, 4th ed, 1911).

FUCHS, IMMANUEL LAZARUS, also called LUDWIG (1833–1902) A German mathematician, born at Moschin, in Posen After teaching mathematics in several institutions he became professor extraordinary at Berlin in 1866 and full professor of mathematics at Greifswald in 1869, at Gottingen in 1874, at Heidelberg in 1875, and at Berlin in 1884 His principal contributions bear upon the theory of functions and the theory of linear differential equations After Kronecker's death, in 1891, he became editor of the *Journal fur die reine und angewandte Mathematik*. His name has been connected by

Poincaré with a discontinuous group (Fuchsians) which is very important in the general theory of functions, and is frequently discussed by Poincaré in the volumes of *Acta Mathematica* (Stockholm)

FUCHS, JOHANN NEPOMUK VON (1774–1856) A German chemist and mineralogist He was born at Mattenzell and was educated at Freiberg, Berlin, and Paris In 1807 he became professor of chemistry and mineralogy at the University of Landshut, in 1823 curator of the mineralogical collection at Munich, and in 1826 professor of mineralogy at the University of Munich He published a number of interesting papers on chemistry, mineralogy, and crystallography, and his *Gesammelte Schriften* were published at Munich in 1856 He is known for his process of making a soluble glass used in fixing fresco colors

FUCHS, KONRAD HEINRICH (1803–55) A German physician, born at Bamberg and educated at Wurzburg He was professor of pathology and therapy at Gottingen from 1838 until his death, and wrote the important work entitled *Lehrbuch der speziellen Nosologie und Therapie* (1844–48). He also published *Die ältesten Schriftsteller über die Lustseuche in Deutschland* (1843) The pathologico-anatomical collection at the University of Gottingen was founded by him

FUCHS, or **FUCHSIUS,** fuk′sĭ-us, LEONHARD (1501–66) A German botanist, born at Wembdingen, in Bavaria, studied at Ingolstadt, under Reuchlin, and in 1535 became professor of medicine at Tubingen He published a number of excellent works on botany, the most important of which is his beautifully illustrated *De Historia Stirpum Commentarii Insignes* (1542) Fuchs was one of the great herbalists, and in his *Historia Stirpium* made the first attempt at establishing a botanical terminology Some of these terms are still in use, but most of them were founded upon such crude conceptions of morphology that they have been abandoned Nevertheless it was a beginning of scientific terminology and marked a great advance in precision of observation and statement

FUCHSIA, fuk′sĭ-a, the plants and flowers are popularly called fū′sha (Neo-Lat, named in honor of Leonhard Fuchs) A genus of plants of the family Œnotheraceæ, which contains about 70 species, mostly natives of tropical America Some are climbers, some small trees, but the majority are shrubs or half-shrubby herbs The leaves are opposite The flowers, which are solitary and axillary, or sometimes arranged in terminal racemes, are generally pendulous, have a funnel-shaped, four-cleft, finely colored calyx, a four-petaled, usually red, corolla, and a four-celled berry, which in some species is edible Several species are largely employed as greenhouse plants, and in climates not too rigorous they are grown out of doors with slight protection during the cold season They are deservedly popular, because they yield a satisfactory display of bloom with less care in propagation and management than almost any other house plant, and in consequence of their beauty and gracefulness they have developed a great number of varieties, not only of the colors and forms they possess in nature, but others, such as white and double, which are not peculiar to the species from which they originate *Fuchsia macrostemma*, a very variable Chilean species, first attracted European attention about 1790, and for about 75 years usurped both name and fame of *Fuchsia coccinea*, which is considered a more attractive and free-blooming species It has been largely employed, either singly or in crossing with *Fuchsia fulgens*, in the production of cultivated forms Consult Bailey, *Standard Cyclopedia of Horticulture* (6 vols, New York, 1914–15) See Plate of GREENHOUSE PLANTS

FUCHSIN, fōōk′sĭn. See COAL-TAR COLORS

FUCINO, fōō-chē′nō, LAKE A former lake 2 miles east of Avezzano, in Abruzzi, Italy, the ancient Lacus Fucinus, now a vast fertile farm For history of its drainage, see AVEZZANO

FUCINUS LACUS See AVEZZANO, FUCINO

FUCUS See HYDROPHYTES and Plate of HYDROPHYTES

FUDGE FAMILY IN PARIS, THE A skit by Thomas Moore (1818), satirizing the underbred English in foreign countries The satire was followed by a sequel, *The Fudge Family in England*

FUEGIAN, fū-ē′jĭ-an See TIERRA DEL FUEGO, ONA, YAHGAN

FU′EL (OF *fouailles*, from ML. *focale*, fuel, from Lat *focus*, hearth) Any material that is capable of being utilized for the heat it produces upon union with oxygen (See COMBUSTION) The fuel of greatest economical importance is coal Many other substances are, however, rated very high commercially and industrially as fuels Some of these substances, such as wood, peat, and crude petroleum, are of natural origin, others, such as coke, charcoal, and coal gas, are formed artificially A useful classification of fuels is that which divides them according to their state of aggregation, and this classification will be followed in the present article To enumerate The principal solid fuels are coal, peat, coke, charcoal, and wood, the liquid fuels include petroleum, shale oils, and vegetable and animal oils, the gaseous fuels include coal gas, producer gas, water gas, mixed gas, and natural gas The heat of combustion—i e, the heat generated by the combustion of a certain quantity in oxygen —measures the calorific power or heat value of a fuel However, the terms "calorific power" and "heat value" have, in common usage, a slightly wider significance than the term "heat of combustion" The latter term is applied only to the quantity of heat generated by the substance when completely burned, i e, when the carbon and hydrogen are completely changed to carbonic acid and water The terms "calorific power" and "heating value," on the contrary, apply to the measure of an industrial yield as well as to the heat given off by the fuel during its complete combustion Scientifically the term "heat of combustion" is the most nearly correct The units of measure of the quantity of the heat of combustion are the *calorie* and the *British thermal unit* The calorie is the quantity of heat required to raise the temperature of one kilogram of water one degree Centigrade at the temperature of maximum density The British thermal unit (usually abbreviated B. T U) is the quantity of heat required to raise the temperature of one pound of pure water one degree Fahrenheit at its temperature of maximum density, i e, from 39° to 40° F.

There are two methods for finding the heat of combustion of substances. (1) calculation based on chemical composition, and (2) experimental

determination by means of a calorimeter By the first method the units may be calculated directly from the composition of the substance, or indirectly from the quantity of oxygen consumed during combustion in a crucible The direct calculation of the heat of combustion from the chemical composition of the fuel is usually performed by means of Dulong's formula Other general formulas are in use, but they all resemble Dulong's and are usually only modifications of his Dulong's formula, with recent average figures for the constants, as given by Prof William Kent, for coal, is Heating value per pound in

$$\text{B T U equals } \tfrac{1}{100}\left[14{,}650\,\text{C} + 62{,}000\,\text{H}\left(-\frac{\text{O}}{8}\right) + 4000\,\text{S}\right]$$

in which C, H, O, and S are respectively the percentages of carbon, hydrogen, oxygen, and sulphur in the coal Prof Kent points out, as the result of a comparison of numerous data, that the relation of the heat of combustion of coal to its ultimate analysis is expressed by Dulong's formula with remarkable accuracy, i e, within a limit of error of usually less than 2 per cent The method of calculating the heat of combustion indirectly, from the quantity of oxygen consumed, is also expressed by a general formula, but this formula has been shown to be of very questionable value and is now used only where no other methods of determination are possible

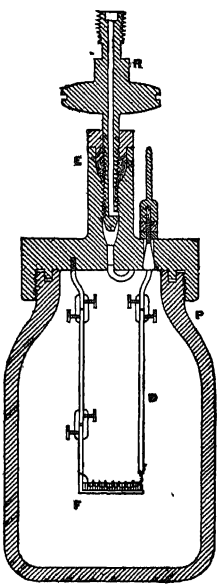

FIG 2 SECTION OF COMBUSTION CHAMBER OF MAHLER CALORIMETER

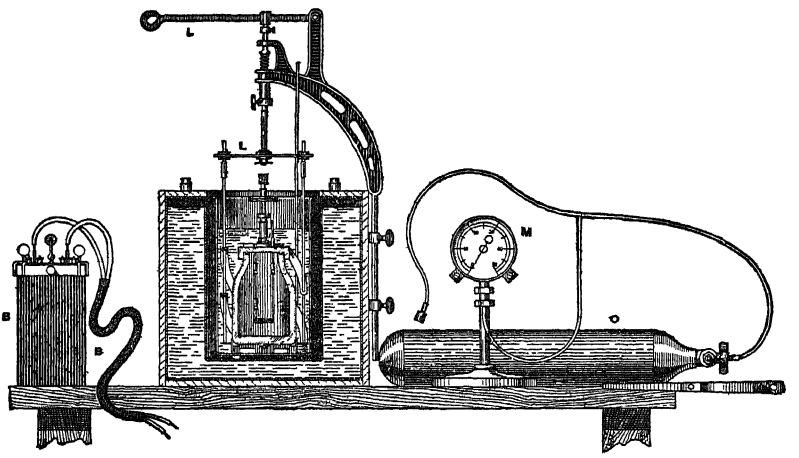

FIG 1 MAHLER CALORIMETER FOR MEASURING THE HEATING VALUE OF FUEL

It is generally conceded that the ultimate test of the heat of combustion of a fuel is its determination by actual combustion in a calorimeter Calorimeters are made in various forms, but they all consist of a combustion chamber in which the sample of fuel is burned, surrounded by a chamber containing a known quantity of water whose rise of temperature is shown by a thermometer The Mahler calorimeter (one of the most perfect of such devices) is shown in the accompanying engravings, of which Fig 1 shows the apparatus complete with its accessories, and Fig 2 shows the combustion chamber, or bomb, separated from the other apparatus The combustion chamber (Fig 2) consists first of a steel shell, *P*, and a stopper or cover, *E* The shell has a capacity of 40 cubic inches, is nickeled on the outside, and has a coating of enamel on the inside The stopper *E* screws down tightly into the shell and is made of iron It carries a stopcock, *R*, of fine nickel, and through its top passes an insulated electrode, *D*, reaching the interior by a platinum wire. Another platinum wire, suspended from the cover, carries a disk, *F*, on which the fuel is placed The bomb is supported inside a cylindrical vessel so as to be surrounded by water, as shown by Fig 1 In this illustration *L* is a pumplike mechanism for agitating the water surrounding the bomb, *O* is a cylinder containing oxygen under pressure, *M* is a pressure gauge, and *B* is an electric battery The manipulation of the apparatus and the fuel in making a test is substantially as follows Weigh one gram of the fuel to be tested and place it on the disk *F*, then make connection between the electrode *D* and the disk *F*, screw down the cover *E*, put the stopcock *R* in connection with the oxygen cylinder *O* and open it carefully, so as to allow sufficient oxygen to pass into the bomb for the required pressure, close the cock of the oxygen chamber, then the cock *R*, and then disconnect the oxygen chamber, place the bomb in the water chamber and adjust the agitator *L* and the thermometer, pour in the previously weighed water and operate the agitator a few minutes to restore equilibrium of temperature, note the thermometer; connect the electrode with the battery and thus kindle the fuel, read the thermometer one-half minute after kindling, then at minute intervals until the readings begin to decrease regularly, next open the cock *R* and afterward the bomb, which should be washed inside with distilled water to collect the acids formed, and determine the acids volumetrically The mode of procedure described furnishes all the data to be obtained by the test proper, the observer then proceeds to calculate the heat of combustion from these data This calculation is a rather formidable one, and the interested reader should consult special treatises on calorimetry for its explanation The result obtained is the heat of combustion expressed in terms of calories or of British thermal units (See HEAT; THERMOCHEMISTRY) When coal is the fuel tested, it is reduced to moderately coarse powder before being placed on the disk Heavy oils, tars, etc,

are weighed directly onto the disk Volatile oils are inclosed in pointed glass bulbs, which are placed on the disk, and the ends of which are broken off just before closing the bomb Gases are simply pumped into the bomb. A calorimetric test, in order to give reliable results, requires expert manipulation and extreme care

Solid Fuels Of the solid fuels used at present, coal is by all odds the most important Coal is a very varied product, and its value as a fuel is correspondingly variable According to geologists, a bed of coal was many ages ago a mass of damp vegetable fibre, a portion of a peat bog Through successive geologic ages the peat bog was submerged and overlaid with mud and glacial drift, tilted and compressed by upheavals of the earth's crust, and subjected to intense heat During these processes it underwent a more or less complete destructive distillation The conditions under which this distillation took place were not uniform, the variable factors were time, depth, and porosity of the overlying strata, pressure and temperature, disturbance of the beds, and the intrusion into them of mineral substances, such as clay, sand, iron, and sulphur As a consequence the product of the distillation—viz, coal—varies all the way from the original peat, through brown coal or lignite, bituminous, semibituminous, semianthracite, and anthracite, to graphitic coal Graphitic coal has nearly all the volatile hydrocarbon gases and oxygen driven off from it, leaving practically only fixed carbon and ash, the carbon being in a form so hard to burn that the coal is not used as a commercial fuel Lignite is at the extreme opposite end of the scale of coals, it being only one remove from the original peat, i e, the proportion of fixed carbon is small and the proportion of volatile matter large Between these two extremes come the other classes of coal To summarize, there are thus different varieties of coal, due to differences in the extent to which the volatile gases have been driven off from the original peat or other woody coal-forming substance There are also differences in quality in each variety, due to varying percentages of ash and water The ash or earthy matter in coal ranges from 2 to over 30 per cent, the water ranges from less than 1 per cent in the anthracites up to 14 per cent or more in some of the bituminous coals, and to 25 per cent or more in some of the lignites The importance of stating the preceding circumstances lies in the fact that they determine the relative heating value of the different coals for fuel An illustration will explain this truth Coal is composed of four different substances, which may be separated by proximate analysis, viz, fixed carbon, volatile hydrocarbon, ash, and water When coal is burned the moisture is first driven off at a temperature of 250° to 300° F, then the volatile matter is driven off at a red heat, then the carbon is burned out of the remaining coke at a white heat, until nothing is left but ash The fixed carbon has a constant heating value of about 14,600 B T U per pound The heat value of the volatile hydrocarbon depends on its composition, and that depends chiefly upon the district in which the coal is mined It may be as high as 21,000 B T U per pound in the best bituminous coals containing very little oxygen, or as low as 10,000 B T U per pound in some of the poorest bituminous coals having a high percentage of oxygen The ash has no heating value, and the water has in effect less than none, for its evaporation and the superheating of the steam made from it to the temperature of the chimney gases absorb some of the heat generated by the combustion of the fixed carbon and the volatile matter The heating value per pound varies in different districts and bears a relation to the percentage of volatile matter It is the highest in the semibituminous coals, being nearly constant at 15,750 B T U per pound, it is between 14,500 and 15 000 B T U in anthracite, and ranges from 15,000 B T U down to 13,000 B T U or less in the bituminous coals, decreasing usually as the source moves westward, and as the volatile matter contains an increasing percentage of oxygen, as shown by Table II Tables I and II refer only to American coals, and they will be understood clearly if studied in connection with the preceding discussion, with the exception possibly of the last column of Table II This column has been inserted to show the relative theoretical value of the different coals for evaporating water from 212° F to steam at 212° F The following general figures of the heating value of foreign coals give a basis for a rough comparison between the American product and that of other nations

TABLE I—CLASSIFICATIONS OF COALS ACCORDING TO THE RELATIVE PERCENTAGE OF CARBON AND VOLATILE MATTER

KINDS OF COAL	Per cent fixed carbon	Per cent volatile matter	Heating value, B T U per lb	Relative combustible value
Anthracite	97 to 92½	3 to 7½	14,600 to 14,800	93
Semianthracite	92½ " 87½	7½ " 12½	14,700 " 15,000	94
Semibituminous	87½ " 75	12½ " 25	15,500 " 16,000	100
Bituminous, Eastern	75½ " 60	25 " 40	14,800 " 15,200	95
" Western	65 " 50	35 " 50	13,500 " 14,800	90
Lignite	under 50	over 50	11,000 " 13,500	77

COUNTRY	Heating value in B T U
Chile	11,758 to 14,954
France	15,030 " 16,560
Great Britain	4,000 " 15,955
Austria-Hungary	12,213 " 15,131
Germany	11,045 " 15,847
Spain	9,556 " 14,113
Russia	8,748 " 15,665
New Zealand	9,846 " 15,364

These values are the maximum and minimum in each case from a large number of tests The purposes for which different kinds of coal are used do not admit of any very definite classification The coal used in any particular country or locality is determined nearly always by questions of availability and cost. In America

the use of anthracite coal is nearly universal for domestic purposes in the East, and it is also used for industrial purposes in many Eastern cities where public sentiment demands the use of a smokeless fuel The great industrial fuel, however, is coal of the semianthracite and bituminous classes, and the coal used in any particular locality is usually the coal which is most available and the cheapest

In recent years a practice has arisen in large corporations of buying their coal on the basis of the unit of combustible in a given weight This is called buying coal on the "heat-unit basis" A sample is taken from each car or boat load, and the percentage of incombustible matter, ashes, and moisture is determined by the analysis in the chemical laboratory The percentage of carbon is made the basis of the price to be paid per ton of coal, i e, the gross weight is corrected for the net weight of combustible and the price paid is agreed upon on the basis of the net heat value of the coal Many corporations simply deduct the weight of moisture and then determine the B T U by means of an explosion calorimeter and pay on that basis

The solid fuels other than coal are coke, charcoal, coal briquettes; coal dust, peat, wood, sawdust, tanbark, straw, and bagasse *Coke* is the solid material left after evaporating the volatile ingredients of coal, either by means of partial combustion in furnaces called coke ovens, or by distillation in the retorts of gas works It is considerably used as a domestic fuel, and somewhat used for steam making where some special condition prevails, such as the necessity for a smokeless fuel For general steam making, however, its cost and the difficulty of its combustion in ordinary furnaces place coke rather low in the list of fuels available to the steam user For metallurgical processes, an important example of which is iron smelting, coke is almost an invaluable fuel Coke is composed mostly of fixed carbon and ash, the percentage of volatile matter being seldom over 2 per cent, and often less than 1 per cent, of the total Its heating value ranges generally between 14,400 and 14,600 B T U See COKE

TABLE II —SHOWING PROXIMATE ANALYSES AND HEATING VALUE OF AMERICAN COALS

	Moisture	Volatile matter	Fixed carbon	Ash	Sulphur	Heating value per lb coal, heat units	Volatile matter per cent of combustible	Heating value per lb combustible, heat units	Theoretical evaporation lbs water from and at 212° per lb combustible
ANTHRACITE									
Northern coal field	3 42	4 38	83 27	8 20	73	13,160	5 00	14,900	15 42
East Middle coal field	3 71	3 08	86 40	6 22	58	13,420	3 44	14,900	15 42
West Middle coal field	3 16	3 72	81 59	10 65	50	12,840	4 36	14,900	15 42
Southern coal field	3 09	4 28	83 81	8 18	64	13,220	4 85	14,900	15 42
SEMIANTHRACITE									
Loyalsock field	1 30	8 10	83 34	6 23	1 63	13,920	8 86	15,500	16 05
Bernice basin	65	9 40	83 69	5 34	91	13,700	10 98	15,500	16 05
SEMIBITUMINOUS									
Broad Top, Pa	79	15 61	77 30	5 40	90	14,820	17 60	15,800	16 36
Clearfield County, Pa	76	22 52	71 82	3 99	91	14,950	24 60	15,700	16 25
Cambria County, Pa	94	19 20	71 12	7 04	1 70	14,450	22 71	15,700	16 25
Somerset County, Pa	1 58	16 42	71 51	8 62	1 87	14,200	20 37	15,800	16 36
Cumberland, Md	1 09	17 30	73 12	7 75	74	14,400	19 79	15,800	16 36
Pocahontas, Va	1 00	21 00	74 39	3 03	58	15,070	22 50	15,700	16 25
New River, W Va	85	17 88	77 64	3 36	27	15,220	18 95	15,800	16 36
BITUMINOUS									
Connellsville, Pa	1 26	30 12	59 61	8 23	78	14,050	34 03	15,300	15 84
Youghiogheny, Pa	1 03	36 50	59 05	2 61	81	14,450	38 73	15,000	15 53
Pittsburgh, Pa	1 37	35 90	52 21	8 02	1 80	13,410	41 61	14,800	15 32
Jefferson County, Pa	1 21	32 53	60 99	4 27	1 00	14,370	35 47	15,200	15 74
Middle Kittanning seam, Pa	1 81	35 33	53 70	7 18	1 98	13,200	40 27	14,500	15 01
Upper Freeport seam, Pa and Ohio	1 93	35 90	50 19	9 10	2 89	13,170	43 59	14,800	15 32
Thacker, W Va	1 38	35 04	56 03	6 27	1 28	14,040	39 33	15,200	15 74
Jackson County, Ohio	3 83	32 07	57 60	6 50		13,090	35 76	14,600	15 11
Brier Hill, Ohio	4 80	34 60	56 30	4 30		13,010	38 20	14,300	14 80
Hocking valley, Ohio	6 59	34 97	48 85	8 00	1 59	12,130	42 81	14,200	14 70
Vanderpool, Ky	4 00	34 10	54 60	7 30		12,770	38 50	14,400	14 91
Muhlenberg County, Ky	4 33	33 65	55 50	4 95	1 57	13,060	38 86	14,400(?)	14 91
Scott County, Tenn	1 26	35 76	53 14	8 02	1 80	13,700	34 17	15,100(?)	15 63
Jefferson County, Ala	1 55	34 44	59 77	2 62	1 42	13,770	37 63	14,400(?)	14 91
Big Muddy, Ill	7 50	30 70	53 80	8 00		12,420	36 30	14,700	15 22
Mount Olive, Ill	11 00	35 65	37 10	13 00		10,490	47 00	13,800	14 29
Streator, Ill	12 00	33 30	40 70	14 00		10,580	45 00	14,300	14 80
Missouri	6 44	37 57	47 94	8 05		12,230	43 94	14,300(?)	14 80
LIGNITES AND LIGNITIC COALS									
Iowa	8 45	37 09	35 60	18 86		8,720	51 03	12,000(?)	12 42
Wyoming	8 19	38 72	41 83	11 26		10,390	48 07	12,900(?)	13 35
Utah	9 29	41 97	44 27	3 20	1 18	11,030	48 60	12,600(?)	13 04
Oregon lignite	15 25	42 98	33 32	7 11	1 66	8,540	54 95	11,000(?)	11 39

Charcoal is the carbonaceous residue of wood which has been subjected to a process of smothered combustion Its principal use as a fuel is in smelting certain kinds of iron (See IRON AND STEEL) A small amount is used for domestic heating and cooking, and for heating purposes in certain trades and arts Pure charcoal is nearly pure carbon, but commercial charcoal contains considerable volatile matter which is a decided advantage to it as a fuel In fact it has been shown that half-burned charcoal is superior as a fuel to that more completely burned The heat value of ordinary commercial charcoal is between 7000 and 7200 calories.

Briquettes, or patent fuel as they are sometimes called, are composed of coal or coke dust mixed with a binder of pitch, tar, or other substance and pressed or molded into blocks, bricks, ovoids, or other forms Briquettes are not yet made to any extent in the United States, but in Great Britain and continental Europe their manufacture constitutes an important industry They are used like coal for steam making, and industrial and domestic purposes generally

Coal dust, as the name implies, is coal ground to a fine dust or powder Theoretically coal dust should be a most excellent fuel, but it has the practical objection of requiring a rather costly apparatus for grinding the coal and feeding it to the furnace and of requiring great care in its combustion The manner in which coal dust is burned is to inject it into the furnace through nozzles or burners by means of air pressure The furnace used differs from the ordinary coal-burning furnace in being closed and without grates, both the fuel and the air for its combustion enter the furnace through the nozzle or burner Powdered coal was used as a fuel in England as early as 1873, but without much success, and the same lack of success has distinguished most of the subsequent attempts to employ it in steam making Quite recently, however, coal dust has been used in firing cement kilns of the rotary type with so much success that it is now the standard fuel for the rotary-kiln process of cement manufacture The heat of combustion of coal dust is of course the same as that of the coal from which it is ground, its economy as a fuel comes from the fact that in the finely powdered state of dust the coal burns rapidly and thoroughly without the waste of unburned particles and the formation of clinker, that the combustion is smokeless, and that the cost of firing, furnace repairs, and handling of waste is reduced

Peat is the agglomeration of partly decomposed vegetable matter obtained from peat bogs, cut into blocks, and dried to serve as a fuel Its composition varies but little from that of wood, the composition of Irish peat, e g, being carbon 59 per cent, hydrogen 6 per cent, oxygen 30 per cent, nitrogen 1 per cent, and ash 4 per cent Air-dried peat contains from 10 to 25 per cent of water The heat of combustion of peat is lower than that of brown coal or lignite; for dry Irish peat it is about 10,250 B.T U, and for moist Irish peat it is about 7390 B T U. Generally speaking, a pound of peat will evaporate about five pounds of water from and at 212° F. Peat does not rank as a commercial fuel in the United States, but in Ireland and some of the western countries of continental Europe it is so extensively used that the peat industry is one of importance.

Wood is perhaps the most widely known and used of all fuels Wood when newly felled contains from 30 to 50 per cent of water, which after from 8 to 12 months' drying in air is reduced to from 20 to 25 per cent When used as a fuel, wood should be as dry as possible, as otherwise some of the heat generated by its combustion is wasted in vaporizing the contained moisture Evaporative tests made by Brix in Europe gave the following results in pounds of water evaporated per pound of fuel pine, 5 5 pounds, elm, 4 6, birch, 4 5, oak, 4 56, ash, 4 63, beech, 4 47

It will be noted that the coniferous woods have the higher heating values, due to the contained hydrocarbons in the form of pitch and turpentine Pine knot containing much pitch has given as high as 10,863 B T U by test Wood was formerly much used for steam raising, and is now used for this purpose in newly settled countries and where coal cannot be obtained cheaply The countries using wood for making steam are, however, growing fewer each year, owing to the discovery of new coal deposits and the development of transportation systems by which coal can be cheaply imported

The following table shows the composition and heating value of the more common woods

KIND	Carbon	Hydrogen	Oxygen	Nitrogen	Ash	B T U.
Ash	49 18	6 27	43 91	07	57	8,480
Beech	49 06	6 11	44 17	09	57	8,591
Birch	48 88	6 06	44 67	10	29	8,586
Elm	48 89	6 20	44 25	06	50	8,510
Fir	50 36	5 92	43 39	05	28	9,063
Oak	50 16	6 02	43 36	09	37	8,316
Pine	50 31	6 20	43 08	04	37	9,153

Sawdust is often used as a fuel in steam saw mills The conditions necessary for burning sawdust are that plenty of room be given it in the furnace and sufficient air supplied on the surface of the mass It is sometimes burned by blowing it into the furnace by air pressure, much as coal dust is burned The heating power of dry sawdust is naturally the same per pound as that of the wood from which it is derived Generally speaking, sawdust cannot be profitably burned except in furnaces especially designed for its combustion and where it costs nothing Sawdust briquettes have been made and utilized as fuel, but only to a very limited extent *Tanbark*, or more correctly the residue of tanbark which has been used in the process of tanning, is sometimes used as a fuel where it can be had at slight cost The heating value of perfectly dry tan containing 15 per cent of ash is 6100 B T U, according to Peclet The same authority states that tan in the ordinary state of dryness, containing 30 per cent of water, has a heating value of only 4284 B T U The weight of water evaporated from and at 212° F by one pound of tan, equivalent to these heating powers, is, for perfectly dry tan, 5 146 pounds, and for tan with 30 per cent moisture, 3 84 pounds *Straw*, like sawdust and tanbark, is used as fuel under special conditions Experiments have shown dry winter-wheat straw to have a heating value of 6290 B T. U, and the same straw with 10 per cent water a value of 5448 B T U *Bagasse* is the refuse of sugar cane after the juice has been extracted. It is much used as a fuel under the boilers of sugar mills. Its heating value is from 2000 to 3000 B T.U, depending upon the quality

Liquid Fuels. The liquid fuels of greatest practical importance are the mineral oils, petro-

leum and its distillates and residues Of much less, but increasing, importance is alcohol Crude petroleum is a hydrocarbon often containing a small percentage of sulphur and oxygen as impurities It may be broken up by distillation into gasoline, benzine, kerosenes, and other less familiar distillates and residuum of various qualities, any one of which makes a very good fuel under certain conditions Gasoline and its associated distillates are too valuable for other purposes ever to be used as liquids for fuel in metallurgy or for steam making or general heating *Benzine* will also have a restricted use as fuel owing to the difficulty, danger, and expense of transporting it and to the care with which it must be handled Were it not for these objections, benzine would be the best of all oil fuels *Kerosene* is much more suitable for use as a fuel than benzine, because of its portability and the safety and ease with which it can be handled Roughly speaking, American crude petroleum contains from 50 to 75 per cent of benzine, and kerosene and Russian crude petroleum contain from 15 to 50 per cent Peruvian oil is about the same composition as Russian.

The use of kerosene as a liquid fuel is common, but this use is limited by the price of that oil, and its value as an illuminant, to small installations for special purposes For general industrial purposes, therefore, resort must be had either to the crude petroleum or to the residuum remaining after the kerosene has been distilled off the crude petroleum In the United States, where the percentage of residuum is so small that its distillation is demanded for lubricating oil, crude petroleum is the principal industrial fuel oil and is employed in locomotives, steamships, and industrial plants In Russia, however, the percentage of residuum is so great that only a small portion is required for distillation into machine oil, and the remainder is available for fuel The residuum is the fuel oil par excellence, and in Russia it is used in every possible place Fuel oils used as liquids burn with great difficulty and with great smoke unless very finely divided or atomized so as to enter the furnace in the form of spray, the oil being injected into the furnace through nozzle-like burners by air or steam pressure which breaks it up into a fog or mist It then acts as a gaseous fuel Oil firing on locomotives or for general steam making has all the advantages of mechanical stoking—ease and controllability, smokelessness and absence of sparks and ashes.

The coal production of the world is in the neighborhood of 1,360,000,000 tons per year, while that of petroleum is in the neighborhood of 47,000,000 metric tons, of which much is used for illuminants and lubricating purposes The amount of petroleum available for fuel purposes is probably less than 5 per cent of the coal used Obviously it cannot be used very extensively as compared with coal Again, while oil has greater heating value and evaporative efficiency than the best coal, there is always some point where this is counterbalanced by the lesser cost of coal. For example, comparative tests between Lima (Ohio) oil costing 2½ cents per gallon and coal giving an evaporation of 7½ pounds of water per pound of coal showed that the two fuels were equally economical when the price of coal was $3 85 per ton. The heating value of fuel oils ranges between about 18,000 and 21,000 B T U.

Since 1907, when alcohol for use in the arts, and rendered unfit for use in beverages, was freed from tax in the United States (see METHYLATED SPIRIT), it has been used as a fuel for various purposes, as it has been employed also in Europe Though its calorific value, 10,600 B T U, is less than that of the mineral oils, it possesses certain advantages over them, especially for household uses It burns freely, without smoke or disagreeable odor, in almost any kind of burner There is little danger of explosion from it, and, moreover, burning alcohol can be extinguished with water, with which it mixes

Gaseous Fuels. For many purposes the best fuel for heating is combustible gas The ideal fuel is natural gas, but this is obtainable over only a limited area of the earth's surface. Next in value are gases secured by distilling highly gaseous coals or by enriching water gas The following are some of the gases which may be used for fuel *Blast-furnace gas* is the gas given off by blast furnaces for smelting iron ore, and its composition varies with the fuel consumption of the furnace and other conditions Six analyses made from one blast furnace by Prof D S Jacobus gave the following average figures carbon dioxide, 7 08 per cent, carbon monoxide, 27 8 per cent, oxygen, 0 1 per cent, nitrogen, 65 02 per cent The heating value calculated from this analysis was 1175 B T U per pound Blast-furnace gas is used in large steel plants as fuel for internal-combustion engines which drive the blowers and electric generators, and for raising steam under boilers, as well as for heating the hot-blast stoves. Large installations of this kind are to be found at the plant of the Lackawanna Steel Company at Buffalo, N Y., where gas engines of 1000 horse power each run on furnace gas, as well as at the Gary works of the United States Steel Corporation at Gary, Ind, and also in plants at or near Pittsburgh *Coke-retort gas* is the gaseous by-product distilled from coal in making coke It makes an excellent fuel, but until recently was for the most part wasted in coke making as practiced in the United States. To secure coke-oven gas for fuel or other purposes special forms of ovens known as retort or by-product ovens must be employed The gas given off by retort coke ovens varies in heating value at different stages of the process of coking the coal According to tests made on retort-oven gas from Cape Breton coal, the heating value increased during the first three hours from 690 to 770 B T U per cubic foot, then it decreased for 18 hours to 630 B T U., and then more steadily for 12 hours to 340 B T U There is a wide field for the use of coke-retort gases for fuel, but it has been only slightly worked *Water gas* is produced where steam is blown into a bed of white-hot coke, it consists of equal volumes of carbon monoxide and hydrogen or by weight of 28 parts of carbon monoxide and 2 parts of hydrogen The heating value of pure water gas is by calculation 343 B T U per cubic foot Thirty years or so ago there was much hope that water gas could be manufactured and sold extensively as a fuel, but none of the plants established then or since have been commercially successful It has, however, a field of usefulness in small furnaces in manufacturing plants and in gas engines Water gas enriched by hydrocarbon gases from petroleum or gas coal has had great success as an illuminant, and is also much used for domestic stoves and cooking ranges and in certain

of the arts where its convenience counterbalances its cost See GAS, ILLUMINATING AND FUEL

Producer gas, or air gas, is a mixed gas containing carbonic oxide and hydrogen compounds and is formed by the incomplete combustion of coal in special retorts or producers There are a number of producer-gas processes, and the principal ones with the heating values of these products per cubic foot are as follows Mond, 155 B T U , Siemens, 134½ B T U , Dawson, 160 B T U , Lencauchez, 207 B T U *Retort gas*, or coal gas, is gas made by distilling coal in closed retorts heated by coke burning beneath them Before the advent of water gas, illuminating gas was produced by this process A typical analysis of coal gas given by Dr Gideon E Moore shows a heating value of 642 B T U per cubic foot *Oil gas* is gas made by decomposing oil, usually petroleum or its derivatives, by means of heat or steam or by steam and air Pintsch gas, which is so extensively used for car lighting, is, e g , made by allowing the oil to fall drop by drop on a highly heated surface, and it has a heating value of about 1320 B T U per cubic foot Oil gases resulting from a less perfect process range in heating value in the neighborhood of 870 B T U per cubic foot *Natural gas* varies in composition and in heating value The best kinds generally range between 900 and 1100 B T U. in value and the poorest kinds fall as low as 400 B T U Natural gas has been used extensively for domestic purposes, steam making, glass manufacture, iron making, brick making, and for numerous other purposes Its cheapness has until very recently encouraged wasteful use, with the result that in many places the available supply remaining is very limited For the uses of gas and gaseous fuels for power directly in a motor cylinder, see INTERNAL COMBUSTION ENGINES

Economical Utilization of Fuel The question of the economical use of fuel is one of ever-increasing importance and is receiving much study by engineers A high authority, Prof William Kent, has stated the conditions as follows "A fair estimate of the average cost of coal to the consumer, including transportation charges, is $2 50 per long ton, which would make the total fuel bill of the United States, in 1899, approximately $562,757,560 A very large portion of this amount represents a kind of waste that may easily be prevented by means of well-known modern appliances, another portion is waste that is not preventable in the light of our present knowledge, a third is waste that might be saved by the use of appliances which are too expensive to be economically practicable, and a fourth portion is waste that may be saved under some circumstances and not under others Examples of the first kind of waste—i e , that which is easily preventable—are (1) the use of furnaces for burning soft coal under steam boilers, which are not well adapted to that kind of coal, (2) the discharge of exhaust steam into the atmosphere when all or a part of it might be utilized for heating purposes An example of the second kind of waste—i e , that which is not preventable with our present knowledge—is the heat losses in the condensing water of condensing engines and in the jacket water of gas engines An example of the third kind of waste—i e , that which may be saved by the use of expensive appliances—is that part of the heat lost in the chimney gases of steam boilers which might be saved by the use of an economizer. An example of the fourth kind of waste, which is preventable under some conditions and not under others, is that of exhaust steam from engines in a factory or other building, which may be utilized for heating purposes in cold weather, but for which there is no use in warm weather "

To the general reader the phase of the subject which is of most direct practical interest is that referring to waste that may be easily prevented by the use of well-known modern appliances First among these appliances comes the furnace, which if properly designed will insure practically perfect combustion, and if improperly designed will cause a very serious waste of heat-producing fuel Smokeless combustion of fuel, an important matter in cities, is simply a question of perfect combustion The second kind of preventable waste—viz , the discharge of exhaust steam without extracting its useful heat—is less easy to handle Among the means for saving this exhaust heat is the use of economizers and feed-water heaters

A calculation of the possible saving to be accomplished by the use of an economizer has been made by Prof Kent as follows "Assume a boiler evaporation of 8 pounds of water per pound of coal and a production of 20 pounds of chimney gas per pound of coal, or 2 5 pounds of gas per pound of water evaporated If the temperature of the furnace is 2150° F (a theoretical figure, assuming that there is no direct radiation from the fire to the boiler) and the flue gases are 600° F , the heat wasted in the flue gases will be 600 — 2150 = 28 per cent. If by an economizer the temperature of the gases can be reduced to 300° F , half of this waste, or 14 per cent of the total heating value of the fuel, will be saved The efficiency of the boiler alone will be 72 per cent and of the combined boiler and economizer 86 per cent The gain in economy is 14 — 72 = 19 3 per cent The gain of heat per pound of gas is 300 × specific heat 0 24 = 72 B T U , and per pound of water evaporated 72 × 2 5 = 180 B T U Also, suppose the feed water is supplied to the economizer at 100° F and the steam pressure is 150-pound gauge, corresponding to a temperature of 358° F , and 1213 B T U per pound above 0° F The heat furnished to the water by the boiler and economizer will be 1213 — 100 = 1113 B T U , of which 180 B T U is supplied by the economizer and 933 by the boiler The gain in economy is 180 — 933 = 19 4 per cent—a percentage quite possible in practice, provided that there is sufficient heating surface in the economizer and that the feed-water temperature is 100° F , with the gas as hot as 600° F "

After economizers comes the use of steam superheaters The economy gained by superheating is stated to be from 15 to 20 per cent with the most economical forms of engines, when the steam is superheated 100° to 150° F For many purposes the best method of utilizing coal is to convert it into gas and burn the gas in the furnace, or to grind it to dust and burn this dust When all is said, however, the great desiderata in the economical use of fuel are a well-designed and suitable furnace, a similarly perfect boiler, and a well-trained crew of stokers intelligently supervised.

The literature on fuel and its economic utilization is extensive and widely scattered, but the following books will be found to meet all the ordinary requirements for information. William Kent, *Steam Boiler Economy* (New York, 1901);

Herman Poole, *The Calorific Power of Fuels* (ib, 1903), F J Brislee, *An Introduction to the Study of Fuel* (London, 1912), J S Brame, *Fuel, Solid, Liquid and Gaseous* (New York, 1914) The following articles in this ENCYCLOPÆDIA may also be consulted with advantage COMBUSTION, COAL, CHARCOAL, GAS, INTERNAL-COMBUSTION ENGINES, PETROLEUM, COKE, FURNACE, BOILER

FUEL FOR SHIPS. While coal remains—and is likely always to remain—the principal fuel for steam vessels, oil has become a very important competitor, while it is also, in the internal-combustion engines of the Diesel type, displacing to some extent both coal and boilers

Crude oil varies greatly in character The heavy, black, viscous oils of the Mexican fields contain a considerable percentage of asphalt and sulphur, the Texas and Pacific coast oils are less viscous and contain a smaller percentage of these substances, the oils of Oklahoma, Kansas, Louisiana, Colorado, and Wyoming show practically no asphalt and very little sulphur, the Pennsylvania, West Virginia, Ohio, and Indiana oils are the most fluid of all and are free from asphalt and, except in certain districts, from sulphur

Nearly all crude oil can be used for fuel If it contains very little sulphur or asphalt, it is suitable for heavy oil engines of the Diesel type Crude oil is not, however, much used for either of these purposes and the reasons are two. First, the presence of the more volatile oils renders storage dangerous, and second, these light oils have much greater value when separated

The total production of crude oil in the United States in 1911 and 1912 was about 220,000,000 barrels per annum Under former methods of refining and distillation this would have yielded about as follows gasoline, 20,000,000 barrels, kerosene, 65,000,000, gas oil, 20,000,000, lubricating oil, 20,000,000, fuel oil, 80,000,000, paraffin, coke, and loss, 15,000,000 Improved methods of refining and the constantly increasing demand for gasoline will probably increase that product to 25,000,000 barrels or more The amounts of kerosene, gas oil, and lubricating oil are likely to remain about as given Fuel oil will be reduced, at one end by removal of remaining light oils and at the other by slightly increased amounts of paraffin and coke The resulting product would be rather heavy, and in such cases some of the gas oil would be added to secure the necessary fluidity

The Mexican oils have a very much smaller content of gasoline and kerosene and a very much larger one of fuel oil So that it is to them we shall look to supply the greater part of the oil fuel and a large part at least of the oil for Diesel engines Oil for both these purposes must be sufficiently fluid to flow readily. For fuel it must not clog the burners, and for the engines it must burn without undue deposit of carbon

The advantages of oil over coal as a fuel are reduced weight of boiler, reduced size of fire rooms, greatly reduced force of firemen, increased facility of bringing fuel to the fires from considerable distances, ease of maintenance of speed and quickness of attaining it, increased amount of space available for fuel, greater radius of action of the ship, reduced time required to take on board fuel, facility of transshipping at sea through flexible piping or hose, absence of ashes, ash-hoisting or ash-ejecting machinery, and all expense and trouble connected with ashes When oil is burned, the amount of smoke given out can be very exactly controlled, a most desirable feature for naval vessels in war time A further advantage of oil is that it preserves the metal of the compartments in which it is carried, while coal bunkers require frequent scaling and painting These advantages are not only such as have value in naval war, but they largely offset the greater prime cost of oil in determining the total cost of propulsion per horse power, so that under certain conditions oil fuel is economical for merchant ships

The chief objections to the use of oil fuel are its cost, uncertainty of supply in great quantities, and lack of supply in many parts of the world Consult F J Brislee, *An Introduction to the Study of Fuel* (London, 1912), and J S. Brame, *Fuel, Solid, Liquid, and Gaseous* (New York, 1914) See PETROLEUM, FUEL SHIP, NAVAL, COAL, COALING SHIP

FUEL SHIP, NAVAL In the United States navy the vessels of the fleet are, except when in certain home ports, supplied with coal and fuel oil by fuel ships The later vessels of this type are of great capacity (10,500 tons of cargo coal, 1000 to 2000 tons of fuel oil, 2200 tons of bunker coal), and having a speed of 14 5 knots, they are able to accompany the fleet when proceeding at ordinary cruising speed When it is not practicable for them to cruise with the fleet they are sent to meet it at predetermined points The use of radio (wireless) telegraphy greatly facilitates such plans and enables change of the point of meeting to be effected, if that be necessary

The new fuel ships resemble in some respects the cargo steamers of the Great Lakes, having their engines and boilers in the stern and their stores in the bow, the intervening holds being reserved for coal and oil This facilitates discharge and loading They are fitted with coaling gear capable of delivering 1200 tons per hour, all to a single vessel or to two vessels, one on each side This gear is supported by a high steel framework extending the full length of the hold spaces The coal is lifted out of the hold by means of clamshell dredge buckets. When the loaded bucket reaches a point about 20 feet above the deck, it is drawn out on a heavy wire rope on which it is supported by a trolley The outer end of the wire rope is held in position over the deck of the man of war by means of an adjustable arm supported by the framework of the fuel ship When over the proper point for discharging, the bucket is lowered and the coal dumped. Fuel oil is pumped on board the warship through suitable hose All recently built destroyers and some new battleships are fitted to use only oil as fuel Other new battleships use both coal and oil Very few navies have specially built fuel ships They rely upon coaling stations or vessels of their mercantile marines. See COALING SHIP, FUEL FOR SHIPS.

FUENTEOVEJUNA, fwān'tā-ō-vā-hōō'nā. A town in the Province of Cordova, Spain, 45 miles northwest of the city of Cordova (Map. Spain, C 3) It is situated in a well-watered agricultural region. In the surrounding country are deposits of argentiferous lead, calcite, and building stone The town manufactures leather, soap, flour, bricks, and tile The curing of meat is

an important industry, owing to the number of cattle There is abundant trade in wheat, wine, fruit, and honey The parish church occupies the site of the palace of the Knights of Calatrava, to whom the village was granted by Henry III in 1430 Some authorities maintain that Fuenteovejuna is the ancient Mellaria (named from the abundance of honey) Pop, 1900, 11,777, 1910, 13,470

FUENTERRABIA, fwān'tĕr-rä-bē'a, or **FONTARABIA.** A town in the Province of Guipúzcoa, on the French frontier of Spain, about 10 miles east-northeast of San Sebastian, on the river Bidassoa, near its mouth (Map Spain, E 1) It is built on a hill and retains much of the picturesque interest of a ruined mediæval town, though outside of the walls a modern quarter for summer colonists, who come here in increasing numbers, has grown since 1900 It has a castle dating from the tenth century, a pretentious town hall, and many curiously gabled houses The municipal archives contain valuable records Magdalena, situated in the vicinity, is a popular watering place. The fisheries constitute an important industry, there is some coastwise trade, and particularly in the new quarter manufactures of rope, nets, flour, lumber, railway supplies, and paper flourish Pop, 1900, 4422, 1910, 4976 Owing to its position on the French frontier, Fuenterrabia has been the scene of many conflicts, not the least famous of which was when the Prince of Condé was repulsed in 1638 The town was fortified towards the close of the twelfth century, captured in 1794 by the French, and its works were destroyed In 1813 the Duke of Wellington crossed the Bidassoa near Fuenterrabia in spite of the opposition of the French under Marshal Soult The town played a part also in the Carlist wars of the nineteenth century Latin inscriptions found in the vicinity gave basis to the theory that this locality was known to the Romans as Fons Rapidus

FUENTES, fwān'tās, or **FONTE,** fōn'tā, BARTOLOME. A Spanish or Portuguese navigator, who is said to have discovered in 1640 a passage uniting the Atlantic and Pacific oceans north of the American continent An account of this voyage first appeared in a letter published in the *Monthly Miscellany* (London, 1708), but doubt has been cast upon its authenticity, and by many Fuentes is believed to have been a fictitious personage The mystery attaching to the affair has led to considerable discussion among scholars Vancouver admitted the possibility of the discoveries of Fuentes The real or fictitious discoveries assigned to this navigator have been treated in a number of works published in Paris and in London and notably in the book entitled *The Great Probability of a Northwest Passage, Deduced from Observations on the Letter of Admiral del Fonte* (1761)

FUENTES, DON PEDRO HENRÍQUEZ D'AZEVEDO, CONDE DE (c 1535–1610) A Spanish soldier and statesman, born at Zamora He served in the Netherlands and under Alba in Portugal, where he commanded the Spanish army in 1589 and defended Lisbon with complete success against the English From 1591 to 1596 he was civil and military assistant to the royal governors in the Netherlands About 1600 he was appointed captain general and Governor at Milan, where he was incessantly busied with crafty political manœuvres. He has often been confused with another of the name (known to the French as *Fontaines*) who fell at his defeat by the Duc d'Enghien, near Rocroi (May 19, 1643) Consult the life by Duro (Madrid, 1884), and Julio Fuentes, *El Conde de Fuentes y su tiempo Estudios de Historia Militar (Siglos XVI á XVII)* (ib, 1908)

FUENTES DE OÑORO, fwān'tās dā ō-nyō'rō A village of Spain, on the Portuguese border, 14 miles west of Ciudad Rodrigo It is celebrated as the scene of a battle between Wellington and the French under Masséna and Bessières, May 3, 1811 The French, by a furious charge, twice drove back the British lines, but each time the latter, at the point of the bayonet, regained the lost ground When night came on, Masséna retreated, with the loss of about 1000 men The battle, indecisive in itself, served to keep the French out of Portugal and encouraged the English at home. Pop about 1200

FUERO, fwä'rō (Sp, jurisdiction) A term variously applied in Spain to special jurisdictions of privileged classes, municipal charters, and provincial and general codes

1 **Special Fueros.** In the development of legal procedure in Spain during the Middle Ages, certain classes came to be subjected to special jurisdictions, laws, and procedure, known as fueros Thus, there were the ecclesiastical, military, naval, commercial, and other fueros, to which these privileged classes were severally subjected in civil and criminal matters By a decree of Dec 6, 1868, and others of later dates, these special fueros were abolished, and the members of these classes were placed under the ordinary tribunals, with the exception that certain necessary disciplinary powers were left to the Church, the army, and the navy

2 **Municipal Fueros** The most common use of the term "fuero" is to designate the charters and privileges, dealing with civil and criminal as well as economic and administrative matters, which were granted to the municipalities by the kings and the nobles during the Middle Ages. The Moorish conquest destroyed the unity of the old Visigothic code, and as the reconquest went on there arose need for the concession of special privileges to those who undertook the protection of the newly acquired territory The municipal fueros then grew up as the product of the ancient Gothic code and the new circumstances under which its laws were applied The earliest grants date from the eighth century, they become common in the eleventh, and few are found after the fourteenth century In many cases the fuero of one town was applied to another In all, over 800 municipal fueros were granted, some of the more noted are the fueros of León granted by Alfonso V (1020), Nájera by Sancho the Great and confirmed by Alfonso VI (1076), Sepúlveda (1076), Logroño (1095), and Toledo (1118) The essential elements of every municipal fuero were exemptions from taxation and the grant of special privileges However, the fueros offer a collection of administrative as well as civil and criminal dispositions designed to satisfy the necessities of the towns For example, the Fuero of León consists of 48 or 49 sections, the first seven of which refer to ecclesiastical matters, sections 8 to 20 are the regulations regarding civil matters, while sections 21 and following provide for the special privileges, including a right of asylum and exemptions from taxation These fueros were largely suppressed by the

legislation of Alfonso the Learned (1252–75), which was made effective in the following century

3 **Provincial Fueros.** A natural development in legislation was the extension of these local fueros over more extensive regions and their transformation, by virtue of the general law of custom, into constitutional rights of the kingdoms or provinces In time, under the influence of the introduction of the representative element of the Cortes, these charters were collected in the various kingdoms of Spain into general codes, which were confirmed from time to time by the petty monarchs This gradual development, involving a struggle between the princes and the people, forms an interesting chapter in the history of modern constitutionalism In this manner were developed the fueros of Navarre, of the Basque provinces of Vizcaya, Alava, and Guipúzcoa, of Catalonia, Aragon, and Valencia These provincial fueros were based upon the old Visigothic laws, as well as upon the local charters, and grew up in the period between the irruption of the Moors into the Spanish peninsula and the consolidation of the Spanish monarchy under the Hapsburg house Thus, the fueros of Navarre, which had been multiplied during centuries, are considered to have been collected and recorded in 1237, under the title of *Cartulario del rey Tibaldo*, as a result of the contest between Theobald I and his Cortes. However, it is probable that the compilation was really of a later date, though it is usually held to be earlier than the reform of 1330 Ferdinand the Catholic, who united Navarre with the crown of Castile, maintained the fueros, adapting them to the new relations existing with Castile According to the fueros of Navarre the Cortes, chosen for three years, and consisting of the three estates of clergy, nobles, and commons, met yearly, and without their consent no law could be passed or anything of importance undertaken The government consisted of the Viceroy, who presided in the Cortes and Great Council, the Great Council of Navarre, a body similar to the old French parlements, and the *contaduría*, before which all accounts of revenue and expenditure were laid There was no customhouse or toll but at the frontier, and, except the trifling grant of 176,000 reals, nothing flowed into the royal treasury The King took an oath to respect and maintain these fueros

In the Lordship (señorío) of Vizcaya there was the same development—first the grant of local fueros and then the formation of a general fuero through the struggle of the inhabitants with their counts It was not till 1452 that the customs of Vizcaya were formed into a fuero general and confirmed by the King of Castile After the final union of Vizcaya with Castile the code was recast, completed, and confirmed by King Charles I (Emperor Charles V) and published under the title *Fueros, privilegios, franquezas, y libertades del muy noble y muy leal señorío de Vizcaya* According to this charter of rights every new "lord"—this being the title given by the Biscayans to the King of Spain as their Prince—on attaining the age of 14, must come into the country within a year and in certain places appointed for that purpose take the oath to uphold the fueros The government consisted of a *corregidor*, appointed by the "lord," and two deputies, and these, aided by six *regidores* and forming the *regimiento*, conducted the administration The supreme power resided in the General Assembly (*junta general*) which met yearly under the tree at Guernica, regulated all the affairs of the lordship, and appointed the deputies and regidores Justice was administered, in the first instance, by the lieutenants (*tenientes*) of the Corregidor, in the second by the Corregidor and his deputies, and in the third, by the royal court at Valladolid Other privileges were, that every Biscayan of pure blood was counted noble, that except the post office there was to be no royal governing board in the province, that Biscayans were not bound to serve in the Spanish army The fueros of Alava and Guipúzcoa were of analogous origin and character, but differed in details It was on behalf of these fueros that the Basque Provinces fought in the Carlist wars They were abolished in 1837, restored in 1839, and confirmed with modifications in 1841 and 1844. In 1876 a law abolishing the Basque fueros was adopted, and in 1878 a decree was passed assimilating the administration of the Basque Provinces to that of the rest of Spain

A similar development took place in Catalonia, Aragon, and Valencia The fueros of Catalonia were first collected and confirmed by Ramón Berenguer (1068), those of Aragon by Sancho Ramírez (1071), and those of Valencia, by Jaime I (1239) These, with later modifications and confirmations, were the law of these kingdoms till Philip V abolished them in 1707 and made the provinces subject to the laws of Castile Later the fueros of Catalonia and Aragon were restored in part and so remained till the nineteenth century

4 **General Fueros** The first general fuero of Spain was the Fuero Juzgo, a codification of the existing chaotic laws, made during the reign of Chindaswinth (642–649) Its purpose was to unify legislation and by so doing to wipe out the distinctions between the conquerors and the conquered Its provisions were taken from the older codes, especially the Roman, from the decisions of councils, and from the decrees and laws of the Visigothic kings The Fuero Juzgo consists of 12 books, divided into titles and laws The subject matter of the books is as follows I Legislation, its effects and circumstances, II. Purpose of the code and judicial procedure, III Civil code, IV Relationships, V Ecclesiastical matters, VI Accusations and criminals, VII Robbery and deception, VIII Coercion and injuries, IX Fugitives and refugees, X Land, XI The sick, dead, and merchants in foreign trade, XII Conduct of the judges, heretics, and Jews It is a code "without parallel in the annals of jurisprudence" Consult Scott, *History of the Moorish Empire in Europe* (Philadelphia, 1904)

After the coming of the Moors, which largely destroyed the force of the Fuero Juzgo, no attempt at a general codification was made till the time of Alfonso the Learned, who issued among other codes the Fuero Real (1254) It is divided into four books, the first deals with the Catholic faith, contracts, and obligations, the second, with judicial procedure, the third presents a civil code, and the fourth treats of criminal legislation

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Rivero, *Colección de fueros municipales* (ib, 1847), id, *Catálogo de fueros y cartas pueblas de España* (ib, 1852), López Ferreiro, *Fueros municipales de Santiago y de su tierra* (Santiago, 1895–96), Martínez Sueiro, *Fueros municipales de Orense* (Orense, 1912), Meruéndano Arias, *El fuero municipal de Rivadavia* (ib, 1909); *Fuero de Vizcaya, acordado en la Junta de 1452* . . (Bilbao, 1909), *Fueros, observancias, actos de Cortes de Aragón* (Sp trans, Saragossa, 1907), *Los códigos españoles* (ed, San Martín, Madrid, 1872–73) See the article BASQUE RACE

FUERO, JOAQUIN (1814–67) A Mexican soldier He was born at Guadalupe Hidalgo and was educated at the Military College of Segovia, at which he subsequently became professor and vice president After suppressing the insurrection of 1840 he was, in 1843, appointed chief of staff of the army division in Tamaulipas and also fought with distinction in the war with the United States, receiving a wound from which he ultimately died Besides a Spanish translation of General Makenna's *Treatise on Military Tactics*, he published a *Manual del militar, ó tratado completo de instrucción en la ordenanza* (1842)

FUERTES, fwâr'tās, ESTEVAN ANTONIO (1838–1903) An American civil engineer and educator, born at San Juan, Porto Rico He took the degrees of A B and Ph D from the Conciliar College of San Ildefonso, at Salamanca, Spain, and of civil engineering at the Rensselaer Polytechnic Institute, Troy, N Y, the latter in 1861 From 1861 to 1863 he was first an assistant engineer in the Department of Public Works and later director of public works for the western district of the island of Porto Rico In 1863 and 1864 he was assistant engineer, and from 1864 to 1869 engineer, on the Croton Aqueduct Board In 1870–71 he was engineer in chief of the United States expedition to Tehuantepec and Nicaragua, to investigate the practicability of a trans-Isthmian ship canal He became dean of the department of civil engineering in Cornell University in 1873, and from 1890 to 1902 was director of the college of civil engineering and obtained for Cornell an excellent special equipment for this work On retiring from this position he was made professor of astronomy at Cornell and spent the last months of his life supervising the completion of the A C Barnes Observatory Among other undertakings as a consulting engineer, he was engaged on a drainage system for Santos, Brazil He was a member of the American Society of Civil Engineers, the Société d'Ingenieurs of France, and other learned organizations, and published numerous scientific articles and reports He was notably enthusiastic, energetic, and courteous

FUERTES, JAMES HILLHOUSE (1863–) An American hydraulic and sanitary engineer, born at Ponce Porto Rico, son of Prof E A Fuertes He planned and constructed various engineering works for the drainage, sewerage, water purification, and water supply of cities in Brazil, Canada, and the United States, and served as a consulting engineer of various corporations and municipalities He is author of *Water and Public Health* (1897), *Water Filtration Works* (1901), and articles in the *Engineering Record*

FUERTES, LOUIS AGASSIZ (1874–1927) An American painter of birds and an illustrator, son of Prof. E. A. Fuertes He was born at Ithaca, N Y, and graduated from Cornell University in 1897 His habitat bird groups in the American Museum of Natural History are one of the most attractive features of the institution He made 25 decorative panels for F F Brewster, of New Haven, Conn, illustrated *Birding on a Broncho* (1896), *Citizen Bird* (1897), *Song Birds and Water Fowl* (1897), *Birdcraft* (1897), *The Woodpeckers* (1901), *Second Book of Birds* (1901), *Birds of the Rockies* (1902), *Handbook of Birds of Western United States* (1902), Coues's *Key to North American Birds* (1903), *Handbook of Birds of Eastern United States, Upland Game Birds* (1902), *Waterfowl* (1903), and *Birds of New York* (1910), and prepared plates for the *Report* of the New York Game, Forest, and Fish Commission in 1903

FUERTEVENTURA, fwâr'tā-vĕn-tōō'ra One of the Canary Islands (q v), situated north of Grand Canary and south of Lanzarote, across the Straits of Bacayna (Map Spain, G 4) Area, 665 square miles There are a number of extinct volcanoes, with a maximum elevation reaching 2700 feet The soil is only slightly productive, the larger portion being best adapted for grazing Only a few fruit and nut trees survive in this climate The annual rainfall is extraordinarily slight The chief products are figs, olives, almonds, chalk, and gypsum, there are thriving fisheries Pop, 1900, 11,662, 1910, 12,960 Cabras, on the east coast, has a good harbor Capital, Betancuria Pop, 1910, 673

FUESSLI, fus'lē, or **FUSSLI** A Swiss family, originally from Zurich, several members of which were artists —MATTHIAS, called The Old (1598–1665), the first engraver painter of the family, studied in Italy and produced some excellent battle pictures and portraits —His son and pupil, JOHANN KASPAR (1707–82), also an artist, painted portraits, but is celebrated for his work on Swiss artists, *Geschichte und Abbildungen der besten Kunstler in der Schweiz* (1769–79) —His son, JOHANN HEINRICH (1741–1825), born at Zurich, and called in England Henry Fuseli, after traveling in Germany came to England about 1763 and first tried a literary career, but was encouraged by Sir Joshua Reynolds to devote himself to painting He studied in London and Italy and finally made his home in London, where he first attracted attention in 1782 with his painting "The Nightmare" In 1786 he painted a series of pictures illustrating Shakespeare, of which the best is perhaps "Titania and Bottom," in the National Gallery, London, and these were followed in 1799 by 47 paintings illustrating Milton's poems His powerful imagination makes these curious works, often purely metaphysical, very interesting, for he possessed a strong sense of the grotesque and undoubted poetic power, but his action is exaggerated, he was not a colorist, and he never considered the factor of beauty He left about 800 drawings and sketches which are often more characteristic than his paintings As professor of painting in the Royal Academy, he delivered lectures on art, which were in many ways remarkable Twelve of his lectures were published in 1801–20 Consult his biography by Knowles, who also edited his works (London, 1831)

FUGA, fōō'ga, FERDINANDO (1699–1784) A prominent Italian architect of the baroque period, born in Florence in 1699 He worked principally at Rome, where his masterpieces are the Corsini Palace and the exterior of the basilica of Santa Maria Maggiore He then

went to southern Italy, and died while engaged in reconstructing the cathedral of Palermo

FUGATO, fōō gä'tō (It, p p of *fugare*, to put to flight) A passage consisting of fugal imitations Only the entrances of the several voices are given After the first development is completed the composition continues in the free style See FUGUE

FUGER, fu'gēr, HEINRICH (1751–1818). A German historical painter, born at Heilbronn, Wurttemberg He was a pupil of Guibal in Stuttgart and of Oeser in Leipzig Afterward he traveled, and spent some time in Rome and Naples, where he painted frescoes in the Palazzo Caserta On his return to Vienna he was appointed court painter, professor and vice director of the Academy, and in 1806 director of the Belvedere Gallery Among his historical paintings are "The Farewell of Coriolanus" (Czernin Gallery, Vienna), "Allegory on Peace" (1801), and four other canvases in the Vienna Gallery, "Bathsheba" (Budapest Gallery), and among his portraits those of the Emperor Joseph II, the Grand Duchess Elizabeth, Queen Caroline of Naples, and Lord Nelson (National Portrait Gallery, London) He painted in the classic style of David and Mengs and was inclined to be theatrical

FUGGER, fug'gēr A German family of Augsburg, important in continental financial history —The founder of the family was JOHANN FUGGER, master weaver in Graben, near Augsburg, about the middle of the fourteenth century, who married Marie Meissner of Kirchheim —His eldest son, JOHANN, acquired by marriage in 1370 the freedom of Augsburg and began to carry on a trade in linen together with weaving By a second marriage in 1382, with the daughter of a councilor, he had two sons and four daughters This Johann Fugger was one of the council of twelve (*Die Zwolfer*), in the weaving guild, and an assessor of the famous Vehmgericht, or secret tribunal of Westphalia He died in 1409 and left a considerable fortune — His eldest son, ANDREAS, made such good use of his share of the inheritance that he was known as "the rich Fugger" He founded a noble line, which died out in 1583 —Johann's second son, JAKOB, who died in 1469, was the first of the Fuggers who had a house in Augsburg and carried on an extensive commerce —Of his seven sons, three, ULRICH, GEORG, and JAKOB II, by industry, ability, and integrity, as well as by their inheritance, laid the foundation of the princely prosperity of the family Its members married into the noblest houses and were raised by the Emperor Frederick III to the rank of nobles The Emperor Maximilian mortgaged to them, for 70,000 gulden, the County of Kirchberg and the Lordship of Weissenhorn and received from them afterward, through the mediation of Pope Julius II, 170,000 ducats to assist him in carrying on the war against Venice — ULRICH (1441–1510) devoted himself specially to commerce with Austria, and there was hardly an object that did not enter into his speculations —JAKOB (1459–1525) engaged in mining, he farmed the mines in Tirol and accumulated immense wealth, he lent to the Archduke of Austria 150,000 gulden and built the magnificent castle of Fuggerau in Carinthia Under Charles V the house attained its greatest splendor, because it was chiefly through the Fugger guldens that he was elected Emperor Jakob having died childless, and the family of Ulrich being also extinct, the fortune of the house rested with the sons of Georg (died 1506), one of whom MARKUS, entered the Church —The two younger, RAIMUND and ANTONIUS, carried on the business and became the founders of the two chief and still flourishing lines of the house of Fugger The two brothers were zealous Catholics and with their wealth supported Eck in his opposition to Luther During the Diet held by Charles V at Augsburg, in 1530, the Emperor lived in Antonius Fugger's splendid house on the Weinmarkt On this occasion he raised both brothers to the rank of counts and invested them in full sovereignty with the still mortgaged properties of Kirchberg and Weissenhorn, and a letter under the Imperial seal conferred on them the rights of princes In 1535 they received the right of coining money Antonius, at his death (1560), left 6,000,000 gold crowns in ready money, besides jewels and possessions in all parts of Europe, Asia, and America Ferdinand II confirmed the Imperial letter of Charles V and conferred additional privileges on the family The Fuggers continued to carry on commerce, attained the highest posts in the Empire, and several princely houses prided themselves on their alliance with the house of Fugger They possessed the most extensive libraries and collections of art, maintained painters and musicians, and liberally encouraged art and science Ulrich, Georg, and Jakob, the sons of the first Jakob, bought houses in one of the suburbs of Augsburg, pulled them down, and built 108 smaller houses, which they let to poor citizens at a low rent This was the origin of the Fuggerei, which still remains under the same name, with its own walls and gates Many other benevolent institutions were set on foot by Antonius and his sons The race is continued in the two principal lines of Raimund and Antonius, besides collateral branches, all of whom are hereditary members of the Upper House of Bavaria, where the chief domains are A collection of portraits of the most important members of this great house, executed by Dominicus Custos, of Antwerp, appeared at Augsburg (1593 et seq) This collection, increased to 127, with genealogies written in Latin, was republished by the brothers Kilian (Augsburg, 1618), and in 1754 a new edition of the work, still further improved, and containing 139 portraits, was published at Ulm, under the title *Pinacotheca Fuggerorum* Consult Stauber, *Das Haus Fugger von seinen Anfangen bis zur Gegenwart* (Augsburg, 1900), and Jansen, *Studien zur Fugger-geschichte* (Leipzig, 1907)

FUGHETTA, fōō-gĕt'ta A miniature fugue, following in all essentials the laws of a regular fugue The dimensions of all the development sections are reduced, and the more complicated portions, such as strettas and organ points, are omitted See FUGUE

FU'GITIVE SLAVE LAW In the history of the United States, the name of two statutes enacted for the purpose of securing to the slave owners their rights in slaves who had escaped from the State in which they were held in servitude Such statutes were directed to the enforcement of Art IV, Sec 2 of the Constitution, which provides that "persons held to service or labor in one State, under the laws thereof," escaping into another, "shall be delivered up on claim of the party to whom such service or labor may be due" This is generally supposed to have been suggested by a fugitive-

slave clause in the Articles of the Confederation of the New England Confederation of 1643 The existence of slavery depended entirely upon the sanction of State laws and could in no way be affected by Federal laws If, however, slavery was merely a status dependent upon positive enactment, such status ceased when the slave entered a State where slavery was prohibited On the other hand, if the master's right in the slave was a property right, the situation was quite different Property rights were defined by State laws, and the protection of such property rights in all other States was guaranteed by the Federal Constitution Upon the 'property" theory of slavery, it was thus possible to pass such an enactment as that of Feb 12, 1793. This gave the owner or supposed owner of a fugitive slave the right to seize the alleged fugitive, to take him before any Federal judge or certain local magistrates, and, upon satisfying the judge or magistrates of his ownership, to secure a warrant for removing the slave, or alleged slave, to the State of the owner's domicile There was no provision for a jury in this preliminary trial, the warrant might be secured upon the testimony of the owner alone, and a heavy fine was imposed for obstructing the owner or rescuing or concealing the alleged fugitive The rigor of the act gave opportunity for considerable laxity in its enforcement, and as soon as the controversy over slavery became acute, efforts were made to amend the act or to nullify its effect. A way towards the latter end seemed to be opened by the decision in 1842 of the Supreme Court in the case of Prigg against Pennsylvania, in which it was held that the duty of enforcing the statute rested solely upon the Federal authorities Thereupon various States passed laws prohibiting State officials from assisting in the enforcement of this Federal statute and forbidding the use of State jails for such a purpose

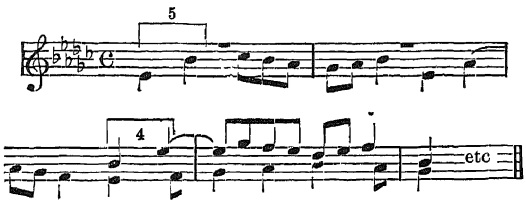
The continued and vigorous demands of the South for a more complete recognition of its rights led to the inclusion in the Compromise Measures of 1850 (q v) of a new Fugitive Slave Law, the Statute of Sept 18, 1850 This included many features of the old act and in addition provided for certain commissioners, with jurisdiction concurrent with that of the courts, who received a larger fee in case they decided in favor of the claimant than if they decided in favor of the fugitive Ex parte testimony was sufficient to determine even the identity of the fugitive, the testimony of the alleged slave was expressly barred, and he was denied a jury trial, even after being returned to the State whence he had fled The enforcement of the law was placed wholly in the hands of Federal officials, and heavier penalties were imposed upon violators of the law. The extreme antislavery element in the Northern States soon forced the issue by refusing to recognize the "finality" of the Compromise of 1850 and by securing the passage of the so-called "personal liberty" laws These prescribed heavy penalties for the seizure of free persons, forbade State officials to aid in enforcing the Federal act, and provided that the fugitive should be entitled to a writ of habeas corpus and to a trial by jury Other requirements of the State laws served to minimize the effect of the Federal statute and in some cases almost to nullify it Ten States passed such laws and thus afforded the South an available ground of complaint The second Fugitive Slave Law was finally repealed on June 28, 1864 Consult McDougall, *Fugitive Slaves* (Boston, 1891), and Rhodes, *History of the United States from the Compromise of 1850*, vols i, ii (New York, 1893) See SLAVERY. UNDERGROUND RAILWAY

FUGLEMAN, fū'g'l-măn (from Ger *Flugelmann*, file leader, from *Flugel*, wing, file + *Mann*, man) A term more common in Europe than in the United States and used to denote a soldier posted a little in advance of the body of troops of which he is a part, to give the time to his fellows, in the execution of an order entailing more than one distinct movement Fixing and unfixing bayonets and drawing or returning swords are instances in point He is usually a flank man, hence the name

FUGUE, fūg (Fr , from It *fuga*, fugue, flight, from Lat *fuga*, flight, from *fugere*, Gk φεύγειν, *pheugein*, to flee, Skt *bhuj*, AS *būgan*, to bend) In music, the name of a composition wherein the parts do not all begin at once, but follow or pursue one another at certain distances, hence the name *fuga*, a flight or chase, each part successively taking up the subject or melody Any voice may begin the fugue, but the others follow according to fixed rules The *subject* is generally a few bars of melody, which is given out in the principal key by the voice which begins The subject of a fugue should always be short—three or four bars—so that it impresses itself upon the memory and can be followed and distinguished in the course of the composition Also, it must *never* be constructed periodically (See FORM) After the subject (*dux*) has been announced, the second voice repeats it a fifth above or a fourth below It is then called the *answer* (*comes*) The first voice meanwhile proceeds with a counterpoint, as does every successive voice upon the completion of the fugue theme This counterpoint, called *countersubject*, is constructed so as to afford the composer opportunities for ingenious contrapuntal combinations in the further development of the fugue The third voice follows with the subject again in the principal key, but an octave higher or lower than the first voice, and is answered by the fourth voice in the same manner as the second voice answers the first When the subject and answer have been introduced in all the parts, the first section, or first *development*, of the fugue is said to be completed, an episode of a few bars then follows, sometimes in its form like part of the subject, and with a modulation into a nearly related key The subject and answer are again brought forward, but following in a different order from the first section, while at the same time all the parts are continued, and in some of them the original counterpoint appears either simply or inverted, the subject and answer forming the predominating idea throughout the whole composition

This is the second development and is again followed by an episode The greater the number of voices that are employed in a fugue, the greater will be the number of development sections A four-part fugue admits of no less than 24 possible development sections, while in a five-part fugue the composer may use any number of developments out of a possible 120 In extended fugues the composer must exercise all his ingenuity on the episodes, otherwise the frequent repetitions of the development section will tire the hearer Beginning with the third or

fourth development, the answer is often given in another interval than the fifth, so as to avoid monotony Even transposition into other keys is permissible Masters of the fugue sometimes give the answer in *inversion*, *augmentation*, or *diminution* (See the separate articles) The last development is generally an exhibition of



all the composer's contrapuntal art Bach generally closes with a *stretto* (q v), where the subject and answer are crowded together, so that the latter begins before the former is completed Often the stretto is elaborated over an organ point (q v) When the subject does not extend in compass beyond the half of an octave, the answer is invariably made in the other half, and, to avoid modulation out of the key, the progression of a fifth is answered by a fourth A fugue consisting of one subject with a counterpoint throughout is called a *strict fugue*

When a second subject is introduced in the middle of the composition and afterward worked up with the first subject, it is then called a *fugue on two subjects*

A *double fugue* begins at once with two subjects in different parts, both of which are strictly treated throughout

There are also fugues with three subjects (*triple fugue*) , a famous example is that in the finale of Mozart's C Major (Jupiter) Symphony A *free fugue* is that in which the subject and counterpoint are not strictly treated throughout, but mixed up with episodes and ideas not connected with the subject The fugue is not, as has been erroneously believed, a production of German genius This form was gradually developed from the canonic tricks of the Dutch masters by the great Italian masters of the sixteenth and seventeenth centuries—Merulo, Frescobaldi, Pasquini It reaches its highest development in the eighteenth century, in the works of Bach (instrumental) and Handel (vocal) Bach's fugues have never been equaled and are, in fact, musical problems of great depth. He devoted a special work to the subject, *Die Kunst der Fuge* (1749) His *Inventionen* and *Das wohltemperirte Klavier* (1722) are necessary to every pianist, and his *Musikalisches Opfer*, elaborated on a theme given to him by Frederick the Great in 1747, are among his best examples Handel ranks next to Bach.

II subject

I subject

Answer to I

Answer to II

I.

etc

II

Celebrated treatises on fugues are by Mattheson, Marpurg, Fux, Albrechtsberger, André, Marx, Lobe, Jadassohn, Cherubini, and Fétis

FUHCHOW, fōō′chou′ See FOOCHOW

FU-HI, fōō′-hē′, or **FO-HI,** fō′-hē′ A legendary or semimythical chieftain of China, the first of the Wu-ti or "Five Rulers," who emerge in succession from the haze of the purely mythical period of Chinese history, and who were succeeded about 2356 B C by Yao, with whose reign the Chinese historical classic known as the *Shu-king* opens The first year of his reign is usually placed in 2852 B C

Fu-hi is the reputed founder of the Chinese nation, and is said to have laid the foundations of civilization among a people who were still little better than beasts, eating raw flesh, clothed with the skins of wild animals, pairing promiscuously, and destitute of even the rudest arts of life He taught them the arts of fishing, hunting, and pasturage, and instituted marriage, dividing the people into 100 families or clans, to which he gave a name, and ordaining that persons of the same clan should not intermarry, a custom observed in China to the present day

His own surname was *Feng*, 'wind,' and his birth was miraculous, having been carried in his mother's womb for 12 years Among many other things, he is reputed to have discovered the elements of writing on the back of a tortoise or dragon, which rose from the waters of the Yellow River From thence he evolved the *Pa-kua* (q v), or 'eight trigrams,' which by combination and multiplication form the 64 hexagrams, on which is based the text of the *I-king*, the oldest book in China, and one of the five *King*, or classics He died in 2738 B C, and was succeeded by *Shen-nung*, the 'Divine Husbandman,' who introduced agriculture and continued the task of civilizing and uplifting his people Consult Mayers, *Chinese Reader's Manual* (Shanghai, 1875), La Couperie, *Western Origin of the Early Chinese Civilization* (London, 1894), Legge, "The Yih-King," in *Sacred Books of the East*, vol xvi (Oxford, 1882), Hirth, *The Ancient History of China* (New York, 1908)

FUHRICH, fu′rĭk, JOSEPH VON (1800–76) An Austrian historical painter and engraver He was born at Kratzau, Bohemia, Feb 9, 1800, and studied under Bergler at the Prague Academy, where he was greatly influenced by the literary works of Schlegel and Tieck He designed 15 plates for the latter's *Genoveva* (1824) and went to Rome in 1827 In that city he joined the German Nazarenes, and while there collaborated with Overbeck, Veit, and Koch in painting the frescoes in the Villa Massimi, of which he painted the three representing scenes from Tasso's *Jerusalem Delivered* Born and bred a country boy, Fuhrich felt the beauty and influence of landscape as a background to biblical subjects, and the study of Durer made him lean towards the portrayal of patriarchal and idyllic scenes, like "Ruth and Boaz," "Jacob and Rachel" All his works are conceived in the spirit of Christian mysticism and show purity of form, grace of movement, and skill in composition and in treatment of drapery, but they lack true sentiment and feeling for color In 1829 he returned to Prague, and in 1834 removed to Vienna, where he was appointed professor at the Academy in 1841 There he continued many of his important works, including a series of frescoes in the church of St John Nepomuk (1844–46) For his fresco painted in the church of Altleichenfeld, a work which occupied the years between 1854 and 1861, he was knighted and received the decoration of the Order of the Iron Crown Among his paintings are the "Mourning Jews" (Gallery of Count Nostiz, Prague), "Christ on His Way to the Mount of Olives," "Peter's Draught of Fish," and "Mary's Journey over the Mountain" (Gallery of Vienna), his best work Among his designs for woodcuts and steel engravings, which by many are considered finer than his paintings, are series illustrating the Psalter, Thomas à Kempis, and the Prodigal Son His etchings include the "Lord's Prayer" (1826) and a cycle entitled the "Triumph of Christ" (1839) At the age of 71 he illustrated the legend of St Gwendolen Fuhrich died at Vienna, March 12, 1876 Consult his autobiography (Vienna, 1875), the monographs by his son Lucas (ib, 1886) and Dreger (ib, 1912), also Worndle, *Joseph Fuhrichs Werke* (ib, 1914), and Muther, *History of Modern Painting* (London, 1907)

FUJI-SAN, fōō′jē-san′ See FUJIYAMA

FUJI′TA SADUSA′KE (1734–1807) One of the leading Japanese mathematicians of the eighteenth century His original name was Honda Teiken and he was born in the Province of Musashi He wrote several works, among them the *Seiyō Sampō* (1779), which was devoted chiefly to algebra His son, FUJITA KAGEN (1765–1821), was also a mathematician of some importance

FUJIWARA, fōō′jē-wa′ra The name of one of the most renowned noble families in Japan, eminent in civil affairs, as the Taira and Minamoto were in military, and the Tatchibana were in religious affairs The founder was Kamatari, Regent of the Empire 645–649 A D, reputed to be the twenty-first in descent from his heavenly ancestor who served the great-grandfather of the first Mikado The family was most powerful at court from the eighth to the twelfth century and down to the present time has been notably productive of statesmen, artists, poets, authors, scholars, historians, etc (Consult Mentchikoff, *Empire du Japon* vol i, Geneva, 1881, for a list of these) The present Empress of Japan is of the Fujiwara family, of the fortieth generation in descent from Kamatari, the founder, the eighteenth from Tadamitsu, the founder of the Kujo family

FUJIYAMA, fōō′jē-ya′ma (more correctly FUJI-NO-YAMA, or FUJI-SAN, frequently but incorrectly called FUSIYAMA) The celebrated mountain of Japan, in the Province of Suruga, 60 miles west of Tokyo, and visible from 14 provinces far out at sea, height, 12,395 feet (Map Japan, F 6) It is a volcano, with a crater 500 feet deep and about 2½ miles in circuit Tradition says that it rose from the plain in a single night (285 B C), while at the same moment Lake Biwa (q v), near Kyoto, was formed The last recorded eruption began Nov 24, 1707, and lasted until January 22 of the following year A hump called Hō-vei-zan (9400 feet), noticeable on its south side, was then produced As the sacred mountain of Japan, it is annually frequented by many thousands of pilgrims from all parts of the Empire. Its summit may be reached by five different paths Shrines and temples are numerous Fuji-San is the focus of Japanese legend, the

frequent theme of the poet, and a familiar object in Japanese art Consult Chamberlain, *Things Japanese* (London, 1892), Griffis, *The Mikado's Empire* (11th ed, 2 vols, New York, 1906), Satow and Hawes, *Handbook for Travelers in Central and Northern Japan* (Yokohama, 1881), and the ordinary books of travel

FUKIEN, fōō'kī-ĕn', or **FO'KIEN,** in the local dialect HOKIONG A maritime province of China, bounded on the north by Chekiang, on the northwest and west by Kiangsi, on the south by Kuangtung, and on the east by the Formosa Channel, area, 46,320 square miles, pop, about 22,000,000, capital, Foochow (q v) (Map China, L 6) In 1886 Formosa (now belonging to Japan) was detached from it and made a separate province Low ranges cross it from southwest to northeast, rising in heavily wooded slopes on the west border to 9000 feet The only level alluvial tracts are found near the mouths of the Min and the Lung and their numerous tributaries The soil is fertile and in a high state of cultivation, producing tea, rice, wheat, barley, sweet potatoes, indigo, sugar, etc Quantities of timber are obtained from the mountainous districts of the interior and floated down the Min to Foochow, where it is transshipped to Shanghai and other ports The manufactures are few Tea is extensively grown and exported, and in May every year British vessels begin to load for England with the new harvest of black tea, most of which comes from the renowned Bohea hills on northern tributaries of the Min, near Kienning and Shauwu

The Province of Fukien has long been noted for its production of porcelain That produced in the Sung dynasty (960–1280) was originally made at Kien-an hien, and is described by an author of the eleventh century as being "invested with a soft black glaze flecked with lighter spots, like the fur of a hare" Fukien porcelain of the present day is white instead of black and is produced at the potteries of Te-hua, established in the early part of the Ming dynasty (1368–1644) This is the kind known to collectors as "blanc de Chine"

Fukien was the great centre of the early trade with the Arabs and Sumatra and is noted historically for its close relations with the Japanese and its stubborn resistance to Manchu rule In our day it is noted for its reformers and progressives

Its two treaty ports are Foochow and Amoy (q v). In 1899 another port, San Tu Ao (Samsah Inlet), farther north, was voluntarily opened to foreign trade by the Chinese authorities

FUKUDA, fōō'kōō'da, TOKUZO (1874–). A Japanese educator, born in Tokyo and educated at the Commercial High School there. In 1897 he was sent by the Japanese government to study in Europe and, after several years at Munich, returned in 1901, became a teacher in the Commercial High School, and (1906) professor in the University of Tokyo He wrote *Die gesellschaftliche und wirtschaftliche Entwicklung in Japan* (1900)

FUKUI, fōō-kōō'ē The name of seven or more places in Japan, but especially of the chief city of the Province of Echizen and the ken or prefecture of the same name (Map· Japan, E 5) It has a population exceeding 50,000 Fukui is situated on both sides of the Ashiwa River, 5 miles from the sea The chief manufacture is habutai, a thin white silk, the production of which in recent years has reached a value of over $10,000,000 The city is clean and cheerful and has had a famous history In the modern renascence of the nation Fukui was one of the first educational centres, and it is at once the stronghold of Buddhism and the seat of thriving Christian missions Consult Griffis, *The Japanese Nation in Evolution* (New York, 1911)

FUKUOKA, fōō'kōō-ō'ka A prefectural town of Japan, situated on the north coast of Kiushiu, about 50 miles from Kokura (Map Japan, B 7) It has a number of fine streets, an old castle now occupied by a garrison, and a public garden Pop, 1903, 71,047, 1908, 82,106

FUKUSHIMA, fōō'kōō-shē'ma A prefectural town of Japan, situated in the Province of Iwashira, 49 miles by rail from Sendai, and 168 miles from Tokyo (Map Japan, G 5) It is an important centre for trade in raw silk and cocoons Pop, 1903, 27,233, 1908, 33,493

FUKUYAMA, fōō'kōō-ya'ma A seaport of Japan, situated at the southern end of the island of Yezo, over 60 miles from Hakodate (Map Japan, C 6) It was formerly the seat of the lords of Matsumai and was the chief outlet for the trade of Yezo Since the abolition of feudalism the town has lost its commercial importance and has been superseded by Hakodate It contains a number of interesting temples and has an estimated population of 15,000

FUKUZAWA, fōō'kōō-za'wa, YUKICHI (1834–1901) A Japanese author and journalist, born in the Province of Buzen Going to Yedo (Tokyo) in 1858, he was so fortunate as to be invited to accompany Awa Katsu in the first Japanese steamer that crossed the Pacific, remaining several months in the United States In 1862 he accompanied a Japanese embassy to Europe and improved his opportunity while in London to purchase a library of foreign books and to improve his knowledge of English In 1866 he published a work, the first of its kind, in several volumes, called *Sei Yō Jijō* (Western Manners and Customs), which became immensely popular and probably did more than any other publication or event to turn the minds of the Japanese towards Western civilization He again visited the United States and on his return was appointed an instructor in the Government College in Yedo, where he continued until the civil war in 1868 He then entered upon that systematic course of literary labor by which, through his books and his newspaper, the *Jiji Shimpo*, he has influenced the reconstruction of Japanese literary style He wrote on an amazing variety of subjects, criticizing old Japanese traditions, opinions, and customs, opened lecture halls, and helped to form the scholarly Méi Roku Sha, or Society of the Sixth Year of Méiji (1874) In 1898 the Emperor bestowed on him a gift of 50,000 yen He died Feb 3, 1901 His second son, Sutejiro, entered Yale in 1883 to study engineering and on his return to Japan in 1890 became manager of the *Jiji Shimpo*. Consult Chamberlain, *Things Japanese* (London, 1891), Griffis, *The Japanese Nation in Evolution* (New York, 1911), Gulick, *Evolution of the Japanese* (ib, 1903); Lloyd, *Every-Day Japan* (London, 1911), Okuma, *Fifty Years of New Japan* (New York, 1909)

FULAH, fōō'la (or *Pulo*, pl *Fulbe*) An important Hamite-Negro people on the upper Senegal River in "Futa Toro and Futa Jallon in compact masses; elsewhere in scattered groups

from Senegambia east to Darfur and south to Adamawa" They are of good stature and light brown or copper color, having long heads (index 74 3), Caucasoid features, black and frizzled, but not woolly, hair, and negroid speech According to Passarge, they strongly resemble the darker Berber populations of north Africa There are four great branches of the Fulah, the *Jęl*, the *Baa*, the *So*, and the *Beri*, and many tribes in each Their name undergoes many changes in the mouths of their neighbors, being variously known as Fula (Mandingan), Fulaji, Fellani (Hausa), Fulata, Fellata (Kanuri), Fullan (Arab), Ufut, Ifulan (southern Tuaregs), Afellen, Ifellen (northern Tuaregs), Peul, Poul (French), Fulah (English) In the term "Fulah-Zandeh" are sometimes included all peoples resulting from the mixing of Ethiopians with Sudanese negroes, extending from east to west across the whole of Africa over a belt of five to six degrees in width Consult Passarge, section "Kamerun," in Hans Meyer, *Das deutsche Kolonialreich*, vol i (Leipzig, 1909)

FULBERT, ful'bâr' (c 960–1028) A French bishop and scholar He was a charity student in the school at Rheims under Gerbert and afterward was connected with the church of Chartres Here he taught, and under his direction the schools of the Academy of Chartres attained a European reputation In 1006 he was elected Bishop of Chartres He caused the burned cathedral to be rebuilt (1020), and part of the present edifice dates from his episcopate He was an active participant in the political affairs of the time and was on intimate terms with King Robert His correspondence, discourses, and hymns are in volume 141 of the *Patrologia* of Migne The letters are valuable history of those days and show the Bishop to have been a man of character and piety. Consult Pfister, *De Fulberti Carnotensis Episcopi Vita et Operibus* (Nancy, 1886)

FULCO See FOULQUES

FULDA, ful'da. An episcopal city, the capital of a district in the Prussian Province of Hesse-Nassau, situated on the river Fulda, 69 miles northeast of Frankfort (Map Prussia, C 3) The most prominent buildings are the noble cathedral erected at the beginning of the eighteenth century in imitation of St Peter's in Rome and containing the remains of St Boniface, the church of St Michael, consecrated in 822; the old palace of the prince bishops, the former Benedictine convent, and a new and modern barracks The town has a teachers' seminary and a school of military music The Catholic gymnasium of Fulda is believed to be the oldest establishment of its kind in Germany and has a library of 40,000 volumes The manufactures include different kinds of textiles, plush, leather, metal goods, farm machinery, musical instruments, soap, chemicals, vinegar, and other products. Fulda is an important cattle market and has large railway shops Pop, 1900, 16,900, 1910, 22,487 The town is identified with the life of St Boniface, who founded an abbey here in 744 In the eighteenth century it was the seat of a university It has belonged to Prussia since 1866

FULDA, MONASTERY OF One of the most famous of the Benedictine abbeys in Germany. It was founded in 744 by Boniface, the apostle of Germany, who desired to establish safe headquarters for further missionary efforts A grant of the spot, with 4 miles of surrounding territory, was obtained from Karlmann, son of Charles Martel Boniface superintended the clearing of the ground and erection of the building, while his disciple Sturmius, destined to be the first abbot, spent a year in Italy, visiting the monasteries and studying the mode of life pursued at the celebrated Benedictine convent of Monte Cassino The abbey soon became a centre of education and civilization for the surrounding tribes and for centuries maintained its position as a place of learning, to which, e g, Alcuin looked for help in his great educational schemes Many privileges were given to it, in 968 the abbot was made primate of the abbeys of Germany, and he was later created a prince of the Empire But with the advance in influence and wealth there was an increasing corruption in many of the monasteries, from which Fulda did not escape At the beginning of the eleventh century a reform was attempted by substituting new monks from Scotland for the old and reestablishing in all its strictness the Benedictine rule The Reformation of the sixteenth century brought discord into the community, but Balthasar von Dermbach (abbot, 1570–1606) effected the suppression of the new doctrines Abbot Schenk von Schweinsberg (1623–32) completed the work of reformation, supported by Pope Urban VIII In 1626 he brought 17 monks from St Gall to set a good example With the election of Joachim von Gravenegg, in 1654, the abbey entered upon a new period of prosperity Benedict XIV, in 1752, created the abbot Prince Bishop of Fulda The diocese was secularized in 1802, to be restored, with somewhat different boundaries, in 1829 The buildings of the old monastery were occupied by a clerical seminary, which was one of the first points of attack in the *Kulturkampf* of 1874 The diocese is at present an important one, with about 200,000 Catholic population, the cathedral and episcopal seminary still being at Fulda Consult Arnd, *Geschichte des Hochstifts Fulda* (Frankfort, 1862), and Hartmann, *Zeitgeschichte von Fulda* (Fulda, 1895) A collection of original documents is in course of preparation

FULDA, LUDWIG (1862–) A German poet and dramatist, born at Frankfort-on-the-Main He studied at Heidelberg, Berlin, and Leipzig, and in 1882 obtained a prize in competition by his one-act verse comedy, *Die Aufrichtigen* (1883) After the appearance of a series of comedies, including *Ein Meteor* (1887) and *Die wilde Jagd* (1888), he assumed the manner of the so-called Berlin School of Realism In 1893 he was awarded the Schiller prize for the very successful fairy drama, *Der Talisman* (1893), but the Emperor refused his consent Subsequent works are *Jugendfreunde* (1897), *Lost Paradise* (1898), *Die Zwillingsschwester* (1901), an English version of which was presented in America, *Kaltwasser* (1903), *Novella d'Andrea* (1903); a volume of dramatic studies, *Aus der Werkstatt* (1904), *Der Heimliche Konig* (1906), *Amerikanische Eindrucke* (1906), *Der Dummkopf* (1907), *Herr und Diener* (1910), *Die Seerauber* (1911), *Herr Aladdin und die Wunderlampe* (1912), a tale Fulda's verses are distinguished by their epigrammatic wit, and his plays are skillfully contrived His translations from the French of Beaumarchais, Molière, and Rostand are excellent In 1906 and 1913–14 he lectured in the United States

FULFORD, FRANCIS (1803–68). A Cana-

dian Anglican bishop, born at Sidmouth, England, and educated at Exeter College, Oxford He was curate at Holne and Fawley, rector of Trowbridge, Wiltshire (1832–42), and of Croydon (1842–45), and minister of Curzon Chapel, London (1845–50), and in 1848 was appointed editor of the *Colonial Church Chronicle and Missionary Journal* His knowledge of colonial church affairs led in part to his promotion in 1850 as the first Bishop of the newly created see of Montreal, and his success in that office was so marked that in 1860 he was created Metropolitan of Canada by royal letters patent, the see of Montreal at the same time being given metropolitan rank As an organizer of church work and an administrator, he was eminently efficient, but his great popularity with all classes was due to his tolerant and sympathetic attitude In 1852 he won instant regard from the adherents of non-Anglican churches by his public statement that the Church of England in Canada existed but as one of many religious bodies. He was a learned and scholarly prelate In 1850 he received the honorary degree of D D from Oxford University He published *Plain Sermons on the Church and her Services* (1837–38), *Progress of the Reformation in England* (1841), *Sermon at the Consecration of Horatio Potter, D D, in Trinity Church, New York* (1854); *Sermons and Addresses* (1865), besides many pastoral letters, charges, and lectures

FULGENTIUS. See GOTTSCHALK

FULGENTIUS, fŭl-jĕn'shĭ-ŭs, FABIUS PLANCIADES (c 480–c 550) An African grammarian, of whose life and personality nothing is known save from internal evidence His style is typically African Besides a *Liber de Fictiuis Poetarum* and *Liber Physiologus*, both now lost, he wrote *Mythologicon Libri III*, with etymological explanations after the manner of Martianus Capella, *Expositio Vergilianæ Continentiæ*, which interprets the Æneid allegorically, a history, *Absque Literis, de Ætatibus Mundi*, which does not employ the letter *A* at all in the first book, *B* in the second, etc, through 14 books, and the very untrustworthy *Expositio Sermonum Antiquorum*, which contains many fictitious quotations In the Teubner texts Helm edited *Fulgentii Opera* (1898) His relative Fulgentius (468–533), Bishop of Ruspe, wrote several volumes on theology Consult Zink, *Der Mytholog Fulgentius* (Wurzburg, 1867)

FULGENTIUS, SAINT, OF RUSPE (468–533). A Latin Christian Father He was born at Telepte, northern Africa, of senatorial family He received a good education and became first procurator of his province Disturbed by the turbulence of the times, he retired to a monastery near Telepte. Persecution from the Arian kings drove the monks elsewhere, and Fulgentius went to Rome in 500 Returning to Africa, he founded a monastery He was made Bishop of Ruspe in 508 About 510 he was banished and again in 515, and suffered other persecutions from the Vandal King Thrasimund (496–523) On the death of the King he was recalled and passed his later years in peace He died at Ruspe, Jan. 1, 533, and is commemorated on that day by the Catholic church Fulgentius was an ardent admirer of monasticism and a rigorous ascetic, he was recognized as one of the ablest defenders of Christianity against Arianism and Pelagianism. His works are in Migne, *Patrol Lat*, lxv. His life by his pupil, Fulgentius Ferrandus (c.540), is contained in Migne, *Patrol Lat*, lxvii His letters have been edited by Hurter (Innsbruck, 1884) Consult Mally, *Das Leben des heiligen Fulgentius* (Vienna, 1885), and Bardenhewer, *Patrology* (St Louis, 1908)

FULGURATION. See SURGERY

FULGURITE, fŭl'gū-rīt (from Lat *fulgur*, lightning, from *fulgere*, to flash, connected with *flagrare*, to blaze) A name given to tubes or pipes found in rocks and sands and formed by the actual fusion of these materials by lightning Such tubes may have a diameter of from 1 to 2 inches at the surface, but as they descend in a vertical or oblique direction they branch and rapidly lessen in size They are commonly found in such regions as are visited by frequent and violent storms, often on mountain peaks

FULHAM, ful'am A metropolitan borough of London, England, formerly a suburban village, 6 miles southwest of St Paul's Cathedral, on the left bank of the Thames, opposite Putney, with which it is connected by two bridges (Map London, E 6) It includes the residential districts of West Kensington and Walham Green Its distinction dates from the reign of Henry VII, when it was chosen as the summer residence of the Bishop of London The episcopal palace, an extensive brick building, parts of which date from the sixteenth century, stands in fine grounds girded by a moat, 1 mile in circuit The parish church of All Saints, restored in 1881, with a picturesque perpendicular tower of the fourteenth century, contains the tombs of several bishops of London The borough maintains electric lighting, public libraries, baths, hospitals, and charitable institutions At the Queen's Club most of the athletic contests between Oxford and Cambridge and American universities are held. Pop (borough), 1901, 137,289, 1911, 153,325

FULK, or **FULC,** or **FOULQUES,** fōōlk The name of several counts of Anjou—FULK II (938–958), called "the Good," is remembered for his saying that "An illiterate king is a crowned ass"—FULK III, called "the Black" (972–1040), became Count in 987 He was a successful and indefatigable warrior, but was renowned chiefly for his repeated pilgrimages to the Holy Land, whither he went as a penance for his many crimes—FULK V, called "the Young" (1092–1143), became Count in 1109 In 1129 he went to Jerusalem, where he married Melisande, the daughter of King Baldwin II In 1131 he succeeded his father-in-law as King (of Jerusalem), and reigned until 1143 He strengthened the kingdom to a large extent by making alliances and by driving back the Turks He was succeeded by his two sons Baldwin III and Amalric I

FULKE, fulk, WILLIAM (1538–89). A Puritan controversialist He was born in London, graduated from Cambridge, and began the study of law, but gave it up for theology He became fellow of his college (St John's) in 1564, rector of Warley and Dennington in 1569, and master of Pembroke Hall, Cambridge, 1578 He was a Puritan of the most extreme type and particularly delighted in controversy His *Defense of the Sincere and True Translation of the Holie Scriptures into the English Tong Against the Cavils of Gregory Martin* (1583), *Stapleton's Fortress Overthrown* (1580); *Rejoinder to Martiall's Reply Against the Answer of Martin Calfhill* (1580), and *Discovery of the Dangerous Rock of the Popish Church* have been reprinted

by the Parker Society, with a memoir (Cambridge, 1843–48)

FUL'LAM, William Freeland (1855–1926) An American naval officer, born in Monroe Co., N Y He graduated at the head of his class from the United States Naval Academy in 1877 and was promoted successively through the lower grades to the rank of commander in 1905 and captain in 1909 From 1883 to 1904 he served at the Naval Academy as instructor in various departments and later as head of the department of ordnance During the Spanish-American War he served on the *New Orleans* He commanded the *Chesapeake, Terror*, and *Marietta*, was commandant of the Naval Training Station at Newport, R I, in 1907–09, commanded the *Mississippi* in 1910, and directed naval training on the Great Lakes in 1912 In 1914 he became superintendent of the United States Naval Academy He is author of *Hand-Book of Infantry and Artillery, United States Navy* (1899), and *Text-Book of Ordnance and Gunnery* (1902, rev ed, 1903, new ed, 1905)

FUL'LER, Andrew (1754–1815) An English Baptist minister, controversial writer, and promoter of foreign missions He was born at Wicken, Cambridgeshire, Feb 5, 1754 He received the rudiments of an education at the free school of Soham and in 1775 was chosen pastor of the Baptist congregation of that place In 1782 he removed to Kettering, Northamptonshire, to take the pastorate of a congregation there, and remained there till his death, May 7, 1815 His first interest in foreign missions was shown in 1784, and his sermon, *The Gospel of Christ Worthy of All Acceptation* (Northampton, 1785), greatly impressed Carey, the first Baptist missionary When the Baptist Missionary Society was formed at Kettering in 1792, he became its secretary and gave the remainder of his life to its affairs. His writings were very popular, they include *The Calvinistic and Socinian Systems Examined and Compared as to their Moral Tendency* (1794), *The Gospel its Own Witness* (1799), *An Apology for the Late Christian Mission to India* (1808) There are several editions of his collected works For his biography, consult· Rylands (London, 1816), T E Fuller (ib, 1863), and A G. Fuller (ib, 1882)

FULLER, Arthur Buckminster (1822–62) An American Unitarian clergyman He was born at Cambridgeport, Mass, graduated at Harvard College in 1843, and studied theology in the Harvard Divinity School He was a teacher and missionary in Illinois, and pastor at Manchester, N H, Boston and Watertown, Mass He volunteered in the Federal army in the Civil War, was made chaplain in a Massachusetts regiment, and was killed at Fredericksburg, crossing the Rappahannock He was a brother of Margaret Fuller (Marchioness Ossoli) and edited several of her works (1855) Consult R F Fuller (his brother), *Chaplain Fuller* (Boston, 1863), and a sketch by Higginson in *Harvard Memorial Biographies*, vol. i (Cambridge, Mass, 1866)

FULLER, George (1822–84) An American figure, portrait, and landscape painter, born at Deerfield, Mass From 1836 to 1838 he was in Illinois with a party of civil engineers and was associated with Henry Kirke Brown the sculptor Returning to Deerfield, he completed his rather scanty education and tried his hand at landscape and portrait painting. In 1842–43 he studied with Brown in Albany He spent several years in Boston as a portrait painter, then removed to New York and continued his studies at the Academy He was elected associate of the National Academy in 1857, upon an exhibition of a portrait of his first master, Henry Kirke Brown He spent three years in the South, making many studies of negro life, and in 1860 he went to Europe On his return to Deerfield he combined his interests as an artist and farmer For 16 years he ceased to exhibit his pictures, and during this period he developed an individual style, very different from his precise, prosaic early work, which differed little from the average output of the day Finally, being in need of money, in 1876 he exhibited 14 pictures in Boston, which were received with enthusiasm This was followed by frequent exhibitions at the National Academy in 1879 he showed the "Romany Girl" and "She Was a Witch" (Metropolitan Museum, New York), in 1880 the "Quadroon," an admirable production (Metropolitan Museum), and in 1881, the finest of all his works, 'Winified Dysart," and "Nydia" (Metropolitan Museum) were painted, and in 1883 "Arethusa" and "Turkey Pasture in Kentucky" The subjects of Fuller's pictures are extremely simple, conceived in a pictorial spirit His landscapes are not so much definite pictures of localities as idealized studies of color, light, and foliage, with a poetic expression of sun and shadow He preserved all the large lines of form, sacrificing the minor details to the beauty of the whole The essence of his art was selection Fuller was the forerunner of a new tendency in art, that of the Idealistic school He was one of the founders of the Society of American Artists Consult his biography by Millet (Boston, 1886), Van Rennselaer, *Six Portraits* (New York, 1889), Isham, *History of American Painting* (ib, 1905)

FULLER, Henry Blake (1857–) An American novelist and story-writer, born in Chicago His first story, *The Chevalier of Pensieri-Vani*, was published anonymously, won favor in the eyes of Professors Norton and Lowell, and, on its republication (1892), became popular In 1892 also appeared *The Chatelaine of La Trinité* Both were romantic *The Cliff Dwellers* (1893) was an essay in relentless realism This picture of Chicago life was followed by the realistic *With the Procession* (1895), kindlier in touch, with humor playing over its seriousness His work also includes *Under the Skylights* (1901), *Waldo Trench and Others* (1908), and 12 one-act plays collected in *The Puppet Booth*

FULLER, Loie. An American actress and dancer, noted for her invention of the "Serpentine Dance" She was born near Chicago, and as a child appeared at the Academy of Music there Subsequently she appeared in a variety of characters (including Ustane in *She*) before devoting herself to her specialty In later years she resided chiefly in Paris, where she appeared at the Folies-Bergère and in 1900 in a theatre of her own In 1913 she published a volume of reminiscences called *Fifteen Years of a Dancer's Life*

FULLER, Lucia Fairchild (1872–). An American miniature painter, born in Boston She studied at the Cowles Art School under Dennis M Bunker, and at the Art Students' League under William M Chase and H Siddons Mowbray In 1893 she was married

to Henry Brown Fuller After 1889 she came to be known as a painter of miniatures She won a bronze medal at the Paris Exposition in 1900, a silver medal at the Buffalo Exposition in 1901, and a gold medal at the St Louis Exposition in 1904 She became president of the American Society of Miniature Painters, and in 1906 was elected an Associate National Academician

FULLER, MARGARET See FULLER, (SARAH) MARGARET

FULLER, MELVILLE WESTON (1833–1910) An American jurist Born in Augusta, Me, he belonged to a family of lawyers, his maternal grandfather, Nathan Weston, having been a justice of the Maine Supreme Court He graduated at Bowdoin College in 1853, studied at the Harvard Law School, began legal practice at Augusta in 1855, and was also there for a time an associate editor of the *Age*, a Democratic newspaper In 1856 he was president of the Augusta Common Council and city attorney, but resigned his offices and established himself at Chicago, Ill He was a member of the Illinois State Constitutional Convention of 1862, and in 1863–65 was a member of the Lower House of the Illinois Legislature In 1864, 1872, 1876 (when he placed T A Hendricks in nomination), and 1880 (when he withdrew from active politics) he was a delegate to the Democratic National Convention As a lawyer, he attained prominent rank locally, but he was not widely known when in 1888 he was appointed by President Cleveland Chief Justice of the United States Supreme Court, to succeed M R Waite (q v), deceased In 31 cases during his term he dissented from the majority of the court In December, 1889, he delivered before the two Houses of Congress an address commemorating the inauguration of President Washington In 1899 he was a member of the Arbitration Commission convened at Paris for the adjustment of the Anglo-Venezuelan boundary question, and in 1904–05 he was chosen by Great Britain as arbitrator at The Hague in the case of the French flag at Muscat He received the degree of LL D from Harvard in 1891. Consult an article by Reeder in *University of Pennsylvania Law Review* (October, 1910), for a summary of his work in the Supreme Court

FULLER, RICHARD (1804–76) An American Baptist clergyman He was born in Beaufort, S C, studied at Harvard, was admitted to the bar, and after successful practice entered the Baptist ministry—in 1831 he had become a Baptist after being brought up as an Episcopalian From 1846 until his death he was pastor of the Seventh Baptist Church in Baltimore He was a leader of the proslavery party in the church, as Francis Wayland was of the antislavery party, and their controversies led to the split into the Northern and Southern churches He published *Letters* [to Bishop England] *on the Roman Chancery, Correspondence on Domestic Slavery, Baptism and Close Communion* (1849), *The Psalmist*, a hymn book used in America and England, *Scriptural Baptism* (1863) Consult Cuthbert, *Memoir of Richard Fuller* (New York, 1879)

FULLER, (SARAH) MARGARET, (MARCHIONESS OSSOLI) (1810–50) An American critic and essayist, born at Cambridgeport, Mass, May 23, 1810. The eldest of the eight children of Timothy Fuller, a Massachusetts lawyer and politician, she was strenuously educated by her father, by Dr Park of Boston, and in the Misses Prescott's School of Groton, beginning Latin at six and Greek at 13, and permanently injuring her health by overapplication On the death of her father (1835) she supported her brothers and sisters by public and private teaching in Boston and Providence She was a frequent guest at Brook Farm, though never sharing its enthusiasms, held intellectual conversations in Boston, conducted the Transcendental organ, the *Dial*, for the first half (1840–42) of its brief existence, made translations from the German, and published in 1844 her first volume, *Summer on the Lakes*, the record of a season of travel in 1843 In December (1844) she went to New York as literary critic of the *Tribune*, taking active part in the philanthropic, literary, and artistic life of the city In 1846 she went to Europe, residing for some time at Rome, where she married (December, 1847) Giovanni Angelo, Marquis Ossoli, by whom she had one child She took an active part in the Italian struggle for independence and served heroically in the hospitals during the French siege of Rome On its capture (July, 1849) she took refuge with her husband first in the mountains of Abruzzi, then at Florence, and on May 17, 1850, sailed for America, but with her husband and son was drowned off Fire Island Beach just as they were approaching New York on July 16

Her life falls naturally into three periods Till 1844 she lived an intense life, seeking self-culture in the exciting stimulation of the Transcendental circle The two years from 1844 till her visit to Italy are those of original literary production *Women in the Nineteenth Century* (1844) and *Papers on Literature and Art* (1846) are its monuments Her activities in Rome found a literary expression in a book on the Roman Republic, the manuscript of which was lost with her With all her tact and brilliancy, she was not an original genius, she needed the inspiration of an audience, talking better than she wrote Her *Letters* are therefore the most readable of her works, and the position that she held in Boston and in New York is hardly to be understood from her writings Some of these have been edited by Julia Ward Howe It was a natural instinct that led her to select for translation Eckermann's *Conversations with Goethe* (1839) and *The Correspondence of Fraulein Gunderode and Bettina von Arnim* (1840–42). There are biographies by Emerson, Clarke, and Channing (Boston, 1852), Julia Ward Howe (ib, 1883), and Thomas Wentworth Higginson (ib, 1884) There is also a *Memoir* by her brother, Arthur B Fuller (Boston, 1855) Her *Love Letters 1845–6* were published in 1903. Consult also reprint of the *Dial* by the Rowfant Club (Chicago, 1902), H C Goddard, *Studies in New England Transcendentalism* (New York, 1908), *Margaret and her Friends*, 10 conversations ed by Mrs. C H Dall (Boston, 1895), A Macphail, *Essays in Puritanism* (ib, 1905), F A Braun, *Margaret Fuller and Goethe* (New York, 1910).

FULLER, THOMAS (1608–61) An English author and divine He was born at Aldwincle, Northamptonshire, of which parish his father was rector, and was educated at Queen's College, Cambridge, graduating B A. in 1625 and M A in 1628 Two years later he was appointed to the curacy of St. Benet's The next year he became a prebendary in Salisbury Ca-

thedral, and in 1634 he was appointed to the rectory of Broadwindsor, Dorsetshire. Abandoning both his living and his prebend in 1641, he settled in London, where he soon became curate of the Savoy, a church in the Strand In the meantime he had published the *Holy State and the Profane State* (1642), and an account of the Crusades, entitled *History of the Holy Warre* (1643), the most characteristic of his works During the Civil War he adhered firmly to the royal cause and shared in its reverses He was a chaplain in the royal army, when he wrote for the encouragement of his men a manual of prayers and meditations entitled *Good Thoughts in Bad Times* (1645), and a sequel, *Better Thoughts in Worse Times* (1647) About 1648 he was presented to the living of Waltham in Essex In 1650 he published a geographical account of the Holy Land, entitled *A Pisgah Sight of Palestine and the Confines Thereof*, with maps and views In 1655 appeared *The Church History of Britain, from the Birth of Christ Until the Year 1648* (for a modern edition, see that of J. S Brewer, 6 vols, Oxford, 1845) In 1658 he received the living of Cranford, Middlesex, and at the Restoration he was reinstated in his prebend of Salisbury, of which he had been deprived by the Parliamentarians. He was also appointed chaplain extraordinary to the King He died in London The next year (1662) appeared *The Worthies of England*, valuable for the information it contains on provincial history, and abounding in biographical anecdote, witty remark, and acute observation on men and manners Quaint humor is one of Fuller's peculiar characteristics, but his writings are no less remarkable for wisdom, imagination, and, when occasion demands, even for pathos. Consult Bailey, *Life of Thomas Fuller, with Notices of his Books, etc* (London, 1874).

FULLER, THOMAS (1823–99). A Canadian architect He was born in Bath, England, and studied with architects there and in London His first work was the designing and erection of a cathedral in Antigua, West Indies, after which he returned to England. Going to Toronto, Upper Canada, in 1857, he began practice in that city, and in 1859, in conjunction with his partner, Chilion Jones, won first premium for the design, ultimately adopted, of the Parliament building at Ottawa At the same time his firm won second premium for the design for the departmental buildings and Governor-General's residence. Fuller then removed to Ottawa, where he remained until 1867 In that year the competition for the new capitol at Albany was opened, and Fuller's design was one of three for which equal premiums were awarded In the second competition he, in conjunction with Augustus Laver, one of the three competitors, made a design from which the capitol was built Soon afterward the joint design of the two architects for the city hall and the courts at San Francisco, Cal, was accepted Fuller, who had removed to Albany, remained there until 1881, when he returned to Ottawa and in the same year was appointed chief architect of the Department of Public Works, an office which he held until his retirement in 1897

FULLER-MAITLAND, JOHN ALEXANDER (1856–) An English writer on music, born in London He graduated at Trinity College, Cambridge, in 1879, and, after having contributed for a number of years to the London papers, became in 1889 music critic of the *Times* He wrote many articles for the *Dictionary of National Biography*, for Grove's *Dictionary of Music and Musicians* (the appendix of which he edited), and for some of the leading periodicals He also wrote a standard life of Schumann in the *Great Musicians Series* (1884), *Masters of German Music* (1894), *The Musician's Pilgrimage A Study in Artistic Development* (1899), *English Music in the Seventeenth Century* (1902), *The Age of Bach and Handel* (being vol iv of the *Oxford History of Music*, 1904), *Brahms* (1911), and was joint translator with Clara Bell of Spitta's *Life of J S Bach* (1884). He is the editor in chief of the revised edition of Grove's *Dictionary*

FULLER'S EARTH (AS *fullere*, from Lat. *fullo*, fuller). A material resembling clay in appearance. It is fine-grained, of variable color, and has a specific gravity of from 1 8 to 2 2 It derives its name from the fact that its principal use once was for fulling cloth and wool, i e, cleansing these materials of grease At the present day a much more important application is for clarifying cottonseed and lubricating oil, by filtering them through the earth, which absorbs the impurities. Fuller's earth was originally mined only in England, where it occurs in Cretaceous beds which formerly served as the only source of supply for the United States A variety of fuller's earth, known as cimolite, occurs in the island of Argentiera, Greece, and has been mined since ancient times More recently fuller's earth deposits have been discovered near Quincy, Fla, and at other localities in the United States, chiefly in Cretaceous and Tertiary formations The following analyses of fuller's earth show the composition of the material:

	SiO_2	Al_2O_3	Fe_2O_3	CaO	MgO	Na_2O	K_2O	H_2O	Moisture
1	52 81	6 92	3 78	7 40	2 27		74	14 27	
2	62 83	10 35	2 45	2 43	3 12	20	74	7 72	6 41

1 is from Reigate, England, and 2 from Quincy, Fla It should be added, however, that the power of fuller's earth is a purely physical property and stands in no relation to its chemical composition The output of fuller's earth in the United States in 1912 was 32,715 short tons, valued at $305,522 Consult Ries, *Clays, Occurrence, Properties, and Uses* (New York, 1910), and Parsons, *Bureau of Mines, Bulletin 71* (1913).

FULLER'S THISTLE See TEASEL

FULLERTON, GEORGE STUART (1859–1925) An American philosopher and psychologist He was born at Fatehgarh, India, graduated in 1879 from the University of Pennsylvania and in 1883 from Yale Divinity School, and returned to Pennsylvania to be instructor, adjunct professor, and professor, dean of the department of philosophy, dean of the college, and vice provost of the university In 1904 he was appointed professor of philosophy at Columbia University In 1913–14 he was exchange professor at the University of Vienna. He was

president of the American Psychological Association in 1896 His philosophy is realistic His writings include *The Conception of the Infinite* (1887), *A Plain Argument for God* (1889), *On Sameness and Identity* (1890), *On the Perception of Small Differences*, with Cattell (1892), *The Philosophy of Spinoza* (1894), *On Spinozistic Immortality* (1899), *A System of Metaphysics* (1904), *An Introduction to Philosophy* (1906), *The World We Live in, or Philosophy and Life in the Light of Modern Thought* (1912)

FUL'LERTON, LADY GEORGIANA (1812–85) An English novelist and philanthropist, daughter of the first Earl Granville She was born at Tixall Hall, Staffordshire, and in 1833 married Alexander Fullerton In 1844 she published her first novel, *Ellen Middleton* Her second work, *Grantley Manor*, was written in the interest of the High Church party In 1846 she entered the Roman Catholic church and afterward published a number of controversial novels, chief among which are *Lady Bird* (1852), *Too Strange Not to be True* (1864), and *Constance Sherwood* (1865) After 1854 she devoted much time to charity Consult Coleridge, *The Life of Lady Georgiana Fullerton*, trans from the French of Madame P de la F. E Craven (London, 1888)

FULMAR, ful'mar (special use of *fulmar, fulmart, foulmart*, polecat, from AS *fūl*, Eng *foul* + OF *marte*, Fr *martre*, from OHG *mardar*, Ger *Marder*, AS *mearps*, Eng *marten*). Any of several species of strictly oceanic petrels (See PETREL) The common northern fulmar (*Fulmarus glacialis*), the "mallemuck" of sailors, is a bird about the size of a duck, gray above, white beneath, head, neck, and tail pure white, bill yellow, the young are brownish gray It inhabits the most northern seas, in which its numbers are prodigious, breeds on the rocky shores of the Faroe Islands, Iceland, Greenland, Spitzbergen, etc, on the grassy shelves of the precipices, making a slight nest or a mere excavation, in which it lays one egg It is rarely to be seen on the United States coast south of Massachusetts or on the southern coasts of Great Britain, but breeds in great numbers in St Kilda and adjacent islets It is extraordinarily abundant about these isles and is of importance to the inhabitants of St. Kilda, who esteem its eggs and flesh above those of any other bird and gather them in the most perilous manner, descending by ropes from the summit of the precipices. The fulmars are also valued for their feathers, down, and oil, the last is one of the principal products of St Kilda and is obtained from their stomachs The old are said to feed the young with it, and when they are caught or assailed these birds lighten themselves by disgorging it It is amber-colored and has a peculiar and nauseous odor Fulmars feed on all animal substances which come in their way, giving an evident preference to fat and delighting in the blubber of whales Another important species is the giant fulmar (*Ossifraga gigantea*, or *Macronectes giganteus*), notable for its size, which equals that of a small albatross It is found in the Pacific Ocean and is known to sailors as "bone breaker," because of the observed crushing power of its great hooked beak The slender-billed fulmar (*Fulmarus*, or *Priocella, glacialoides*) is a very widely ranging form which occurs on the Alaskan coast of Bering Sea. It is of the same size as the common fulmar, but the bill is much longer and more slender. Several of the fulmars are remarkable for their dichromatism See Plate of FISHING BIRDS

FULMINATE (fūl'mī-nāt) **OF MERCURY** (from Lat *fulminare*, to lighten, from *fulmen*, lightning, from *fulgere*, to flash), or FULMINATING MERCURY ($C = NO)_2Hg \frac{1}{2}H_2O$, or, in its anhydrous state, $(C = NO)_2Hg$ A highly explosive crystalline organic salt of mercury, sparingly soluble in cold water, freely soluble in hot water It is obtained by dissolving mercury in an excess of nitric acid and gradually adding the solution to alcohol The operation is attended with considerable danger and should not be conducted in the neighborhood of flames, as the vapors evolved during the reaction are very inflammable On cooling, fulminating mercury separates out in crystalline form When moist, it may be handled without much danger, but when dry, it explodes with violence if struck by a hard body or if heated Mixtures of fulminating mercury with nitre or with chlorate of potash are employed as the primary of percussion caps

FULMINATE OF SILVER, or FULMINATING SILVER, $C = NO\text{-}Ag$ An organic salt of silver, prepared by heating an aqueous solution of silver nitrate with nitric acid and alcohol It is even more powerfully explosive than the fulminate of mercury, for, even if it is moist or under water, pressure with a hard body will cause its explosion, and when it is quite dry the slightest friction between two hard bodies produces a similar result

FULMINATES. A term applied to a class of salts having the same percentage composition as the cyanates, but, unlike them, exploding violently when heated or struck There are many fulminates, corresponding to the different metals. The preparation of the fulminates is attended with very considerable danger and should not be attempted by inexperienced persons The structural formula at present assigned to the acid, fulminic acid, combined in the fulminates is $C = N - O - H$, a formula first demonstrated by Nef and remarkable because the carbon atom contained in it is shown, not as quadrivalent (as the carbon atom is generally found to be), but as *bi*-valent The fulminate of sodium has been definitely shown to have the corresponding formula $C = N - O - Na$ The acid itself has not been isolated, but has been obtained as an unstable oily liquid in ethereal solution See EXPLOSIVES

FULMIN'IC ACID. See FULMINATES

FUL'TON. A city in Whiteside Co, Ill, 41 miles by rail northeast of Rock Island, on the Mississippi River, and on the Chicago, Burlington, and Quincy, the Chicago, Milwaukee, and St Paul, and the Chicago and Northwestern railroads (Map Illinois, D 2) It contains a Carnegie library There are lime-kilns, novelty works, and manufactures of clay pipes, stoves, etc., and an extensive trade is carried on in grain, lumber, and produce The water works are owned by the city Pop, 1900, 2685, 1910, 2174

FULTON A city in Fulton Co, Ky, 50 miles south of Paducah, on the Illinois Central Railroad (Map Kentucky, A 6) It contains the Carr Institute, Terry-Norman High School, and Tennessee College The industrial establishments include flour mills, foundry and machine shops, a stirrup and whipstock factory, tobacco prizing houses, a harness and saddle factory, and lumber mills The water works are owned by the city Pop, 1900, 2860, 1910, 2575

FULTON. A city and the county seat of

Callaway Co, Mo, 135 miles by rail west of St Louis, on the Chicago and Alton Railroad (Map Missouri, E 3) It is the seat of the State School for the Deaf, State Hospital No 1, an insane asylum, Westminster College (Presbyterian), founded in 1853, Synodical College, Conservatory of Music for Young Ladies, founded in 1874, under the care of the Synod of Missouri, and William Woods College of the Christian church of Missouri, founded in 1890, and it contains a Carnegie library The city is in a rich agricultural and stock-raising region, has an extensive supply of coal and fire clay of excellent quality, and manufactures flour, fire brick, and overalls Settled in 1825, Fulton was incorporated in 1859, and in 1903 became a city of the third class Its government is administered by a mayor and a council elected every two years The city owns and operates its water works and electric-light plant Pop, 1900, 4883, 1910, 5228

FULTON A city in Oswego Co, N Y, 25 miles northwest of Syracuse, on the Oswego River, the Oswego Canal, and the New York Central, the Lackawanna, and the New York, Ontario, and Western railroads (Map· New York, D 4) It has a public library The city carries on a considerable trade in milk and tobacco, and there are manufactures of chocolate, flour, woolen goods, paper pulp, firearms, tools, pocket cutlery, butchers' supplies, excelsior, water motors, ensilage and straw cutters, paper-mill machinery, canned goods, motor boats, canoes, and yachts Pop, 1900, 5281, 1910, 10,480, 1914 (U S est), 13,303, 1920, 13,043 Fulton was settled about 1791 and was first incorporated in 1835 In April, 1902, the villages of Fulton and Oswego Falls, with an aggregate population of 8206 (census of 1900), were consolidated and chartered as a city, the government of which is administered by a mayor and common council The water works are owned and operated by the municipality

FULTON The first steam war vessel, designed by Robert Fulton and built in New York in 1815 The *Fulton* was a vessel of 38 tons, provided with central paddle wheels. She was accidentally blown up in 1829

FULTON, Frederick John (1862–) A Canadian statesman He was born at Bedlington, England, and was educated at Magdalene College, Cambridge Removing to Canada, he practiced law at Victoria, British Columbia, in 1900 was elected a Conservative member of the British Columbia Legislature, and in 1903 was appointed President of the Council in the cabinet of Sir Richard McBride (q v) He afterward filled the offices of Provincial Secretary, Minister of Education, Attorney-General, and Commissioner of Lands In 1906 he was appointed a member of the Royal Institution for the Advancement of Learning, British Columbia, in 1907 a member of the Irrigation Convention, and in 1909 chairman of the Timber and Forestry Commission When Commissioner of Lands, Fulton procured the enactment of a water and irrigation law of much importance In 1909 he retired from public life

FULTON, Justin Dewey (1828–1901) An American Baptist clergyman He was born in Earlville, N Y, graduated at Rochester University in 1851, studied in the Rochester Theological Seminary, and was ordained in 1854 in St Louis, where he was editor of the *Gospel Banner* and whence his antislavery views soon drove him He had pastoral charges in Sandusky, Ohio, Albany, Boston, Brooklyn, N Y, and Montreal, Canada, but was best known for his attacks on the Roman Catholic church Among his works are *Roman Catholic Elements in American History* (1859), *Woman as God Made Her* (1867), *Rome in America* (1884) Consult the sketch of the author in the last-named volume, by R S MacArthur

FULTON, Robert (1765–1815) A celebrated American engineer, born at Little Britain, Pa, of Irish parents, who were in such poor circumstances that all the education young Fulton acquired was the ability to read and write He made good use, however, of his opportunities and passed in study the time allowed him for recreation At an early age he was apprenticed to a jeweler in Philadelphia, and in addition to devoting himself to this trade, he applied himself to painting The sale of his portraits and landscapes enabled him, in the space of four years, to buy a small farm, on which he placed his widowed mother At the age of 22 he proceeded to London, where he studied painting under Benjamin West, but after several years thus spent he abandoned painting to devote himself wholly to mechanics Some works that he executed in Devonshire obtained for him the patronage of the Duke of Bridgewater and of the Earl of Stanhope In 1794 he obtained from the British government a patent for an inclined plane, the object of which was to displace canal locks, and in the same year he invented a mill for sawing and polishing marble His next invention was a machine for spinning flax, followed by one for making ropes He was received as a civil engineer in 1795 and wrote a work on canals, in which he developed his system and ideas Accepting an invitation from the United States Minister at Paris, he proceeded to that city in 1796 and remained there for seven years, devoting himself to new projects and inventions Among the inventions developed here was the *Nautilus*, or submarine boat, carrying torpedoes, invented to be used in naval warfare, but he was unable to secure its adoption by either the French, British, or United States government He next turned his attention to a subject that had frequently occupied his mind before and about which he had written a treatise in 1793, viz, the application of steam to navigation.

In 1803 he constructed a small steamboat, and his experiments with it on the Seine were attended with great success The French government, however, did not give him any encouragement, but he had the cooperation of Robert Livingston, the Minister of the United States to France, who assisted Fulton in his experiments. Returning in 1806 to New York, Fulton superintended the construction of a larger steamship provided with an English engine In 1807 he launched the *Clermont* upon the Hudson, which started off on her trip to Albany in the presence of thousands of astonished spectators At the beginning the average speed was only about 5 miles an hour, which was considered a great achievement From this period steamers, for the use of which on the waters of New York State Fulton and Livingston were granted a monopoly by the Legislature, came into general use upon the rivers of the United States Although Fulton was not the first to apply steam to navigation, as a steam vessel had been tried upon the Forth and Clyde Canal as early as

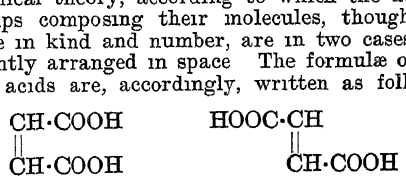
1789, and by Rumsey and Fitch in America in 1786–87, yet he was the first to do so with any degree of success His reputation as an engineer and inventor was now firmly established, and he was employed by the United States government in the execution of various projects with reference to canals and other engineering works In 1814 he obtained the assent of Congress to construct a steam frigate, which was launched in the following year Though the labors of Fulton were attended with such great success, various lawsuits in which he was engaged in reference to the use of some of his patents prevented him from ever becoming wealthy, and anxiety, as well as excessive application, tended to shorten his days His death in New York, Feb 24, 1815, produced extraordinary demonstrations of mourning throughout the United States He married, in 1806, a niece of Robert Livingston, United States Minister to France The centennial anniversary of the construction of the *Clermont* was celebrated in 1909 and a replica of the vessel able to proceed under its own steam was constructed Fulton's published works included *A Treatise on the Improvement of Canal Navigation* (1796), *Letters on Submarine Navigation* (1806), *Torpedo War* (1810), *Letter to the Secretary of the Navy on the Practical Use of the Torpedo* (1811), *Report on the Practicability of Navigating with Steamboats on the Southern Waters of the United States* (1813), *Memorial of Robert Fulton and Edward P Livingston in Regard to Steamboats* (1814), *Advantages of the Proposed Canal from Lake Erie to the Hudson River* (1814) Consult Thurston, *History of the Growth of the Steam Engine* (New York, 1878), id, *Robert Fulton His Life and its Results* (ib, 1891), Colden, *Life of Robert Fulton* (ib, 1817), Reigart, *Life of Fulton* (Philadelphia, 1856), Knox, *Fulton and Steam Navigation* (New York, 1886), Sutcliffe, *Robert Fulton and the Clermont* (ib, 1909), Dickinson, *Robert Fulton, Engineer and Artist, His Life and Works* (ib, 1913)

FUL'VIA Daughter of M Fulvius Bambalio of Tusculum She married first P Clodius, their daughter afterward became the wife of Octavianus (Augustus) In 44 B C she married Marcus Antonius, with whom she was deeply in love, and into all whose ambitious plans she entered with enthusiasm Cicero was murdered in 43, and, when his head was brought to Antonius, Fulvia is said to have pierced with her needle, in vindictive spite, the tongue that had uttered so many reproaches against her husband But Antonius in the East fell into the snares of Cleopatra, and Fulvia attempted to stir up a riot in order to secure his recall to Rome, but failed and was banished from Italy At Athens, Fulvia and Antonius met, and he reproached her so bitterly for her part in political affairs that she retired to Sicyon in despair, and died there shortly after (40 B C) Consult Abbott, *Society and Politics in Ancient Rome* (New York, 1909), Sihler, *Cicero of Arpinum* (New Haven, 1914).

FU'MAGE (OF *fumage*, ML *fumagium*, fuel, from Lat *fumus*, smoke) In the law of England, a chimney tax, commonly called smoke-farthing This tax is mentioned in Domesday as paid by custom to the King for every chimney in the house Edward, the Black Prince, is said to have imposed a tax of a florin for every hearth in his French dominions. The first statutory enactment on the subject in England is 13 and 14 Car II, c 10, whereby a tax of two shillings on every hearth in all houses paying to Church and poor was granted to the King forever This tax was abolished in 1689

FUMARIACEÆ, fū-mā'rī-ā'sē-ē (Neo-Lat nom pl, from *Fumaria*, from Lat *fumus*, smoke) A family of herbaceous plants with watery juice, alternate, much-divided leaves, calyx of two deciduous sepals, corolla of four very irregular, white, yellow, pale-red, crimson, or purplish petals, stamens sometimes four and distinct, more generally six, and in two bundles, ovary free, one-celled, one-seeded, or many-seeded, and seeds with abundant endosperm The Fumariaceæ are related to the Papaveraceæ (poppy, etc), but their general aspect is very different, and they do not possess the same powerful properties About 170 species in five genera are recognized, mostly natives of temperate climates in the Northern Hemisphere, some of great beauty in both flower and foliage Bleeding heart (*Dicentra spectabilis*), a native of China, is a well-known favorite in gardens and greenhouses Several species of *Dicentra* and *Corydalis* are natives of America The common fumitory (*Fumaria officinalis*), a rather delicate and beautiful weed of frequent occurrence in gardens and fields, is an annual of easy extirpation Its leaves, which have an intensely bitter, saline taste, were formerly much employed in medicine as a tonic and diaphoretic, and although disused in America, are still esteemed in France as a remedy for scorbutic affections, chronic eruptions, etc Some other species are credited with anthelmintic, antiperiodic, emmenagogue, and similar properties, but except in household or in foreign medicine they are now little used

FUMAR'IC AND MALE'IC ACIDS (from Neo-Lat *Fumaria*, the type of the herbaceous order Fumariaceæ) Two organic substances having not only the same composition and molecular weight ($C_4H_4O_4$), but the same chemical *constitution* (COOH CH CH COOH), yet differing considerably in both their chemical and physical properties Fumaric acid crystallizes in fine needles and sublimes without melting and without decomposition at 200° C, at higher temperatures it is converted into the anhydride of maleic acid, and it is sparingly soluble in water Maleic acid crystallizes in rhombic prisms that melt at 130° C, and if heated to 160°, loses the elements of water and is converted into maleic anhydride, it is readily soluble in water Both fumaric and maleic acids may be obtained by heating malic (oxysuccinic) acid Maleic acid is, however, more conveniently prepared by distilling the acetyl derivative of malic acid Both fumaric and maleic acids readily form addition products with the halogens and are therefore classed with the unsaturated compounds The relation between the two acids is explained by the modern stereochemical theory, according to which the atomic groups composing their molecules, though the same in kind and number, are in two cases differently arranged in space The formulæ of the two acids are, accordingly, written as follows



See STEREOCHEMISTRY

FU'MAROLE Volcanoes after eruption often continue to send forth water vapor and heated gases in great volume, both from the main vent and from parasitic cones A vent emitting such gaseous discharges is a fumarole or a solfatara Examples of fumaroles are found also in regions where hot springs and geysers occur, as in the Yellowstone Park, but which have had no recent volcanic outbursts The gases evolved differ among individual conduits, the commoner gases are water vapor, hydrochloric acid, carbon dioxide, carbon monoxide, methane, hydrogen, nitrogen, oxygen, sulphur dioxide, and hydrogen sulphide The nature of the gases seems to depend to some extent upon the temperature, which ranges from under 100° C in the cool fumaroles to 400° or 500° in the hot types, such as develop soon after a volcanic eruption See VOLCANO.

FUMBINA, fōōm-bē'na. See ADAMAWA

FUMIGA'TION (from *fumigate,* from Lat *fumigare,* to fumigate, from *fumus,* smoke) The cleansing or medicating of the air of an apartment by means of vapors, employed chiefly for the purpose of destroying odors or disinfecting the room, as well as clothing, furniture, etc. (See CONTAGION, INFECTION) Most of the methods of fumigation formerly employed have little real value and are to be looked on chiefly as grateful to the senses; as, e g, the burning of frankincense, camphor, etc The really active processes are noticed under DISINFECTANTS The application of fumes of medicines to the respiratory tract is also called fumigation For this purpose fumes of tobacco, stramonium, nitrate of potash, muriate of ammonium, and various gums are employed

FUNCHAL, fōōn-shal' (Portug, place of fennel) The capital of the Madeira Islands, Portugal, situated on the southern side of the island of Madeira (Map Spain, E 5). It is a picturesque and well-built town, and contains a cathedral, an opera house, a casino, and a museum. Its streets are mostly narrow and, owing to their steepness, sleds, drawn by oxen, and sometimes luxuriously fitted up, take the place of wheeled vehicles The houses are mostly whitewashed and the principal streets lighted by electricity The well-fortified harbor, though not very safe, is the only port in Madeira for ocean-going steamers Funchal is the seat of a bishop The town lies in a fertile district surrounded by sugar plantations, and vineyards on the slopes of the picturesque mountains which hem it in Owing to its mild climate, the town has come into prominence as a health resort Pop, 1900, 20,844

FUNCK - BRENTANO, fuNk'-brăN'ta'nō', THÉOPHILE (1830–1906). A French philosopher, born at Luxemburg He studied law and medicine in France and abroad In 1873 he became professor at the School of Political Sciences in Paris His works include *Les sciences humaines* (1869), *La civilisation et ses lois* (1876), *La politique* (1892), *L'Homme et sa destinée* (1895), *La science sociale, morale, politique* (1897), *Les sophistes français* (1905) — His son FRANZ, born at Munsbach, Luxemburg, in 1862, became librarian at the Bibliothèque de l'Arsenal. In 1900 he held the chair of comparative legislation at the Collège de France, and in 1904 he lectured before the Alliance Française in the United States and Canada He published interesting studies, dealing mainly with the dramatic and episodical in French history. These include *Légendes et archives de la Bastille* (1898, 5th ed, 1902), *La dame des poisons* (1899, 6th ed, 1903), *L'Affaire du Collier* (1901, 5th ed, 1903), *Les lettres de cachets a Paris* (1904), *Les nouvellistes* (1905), *Louis Mandrin, capitaine général des contrebandiers* (1907), *La régence* (1909)

FUNCKE, fuN'ke, OTTO (1836–1910). A German Protestant theologian He was born at Wulfrath, near Elberfeld, and was educated at Halle, Tubingen, and Bonn In 1868–1904 he preached at the Friedenskirche in Bremen, where he also published a great number of devotional works which have made him widely known Among these are *Christliche Fragezeichen* (15th ed, 1907, Eng trans by E Sterling under the title *Self Will and God's Will,* 1887), *Reisebilder und Heimatklange* (1869, 1871, 1872), *St Paulus zu Wasser und zu Land* (8th ed, 1891), *Die Welt des Glaubens und die Alltagswelt* (9th ed, 1895), *Gottes Weisheit in der Kinderstube* (5th ed, 1890), *Ungeschminkte Wahrheiten* (1902), *Reisegedanken und Gedankenreisen eines Emeritus* (1905), *Christi Bild in Christi Nachfolgern* (4th ed, 1906), *Vademecum fur junge and alte Eheleute* (1908)

FUNC'TION (from Lat *functio,* use, from *fungi,* to employ, Skt *bhuj,* to enjoy, to be useful) The specific physiological processes of a part or organ In the amœba all the functions of the organism are performed by the same protoplasmic mass In higher forms, both plant and animal, where division of labor is established, certain parts take in water, digest food, or excrete waste for the benefit of the whole body This assumption of particular function by certain parts must necessarily involve great changes in form and structure of the organism Any subsequent change in function that an organ may undergo brings about far-reaching changes in structure Certain organs, like the liver and the brain, have many functions Some of these functions we speak of as primary, others as secondary Thus the primary function of an insect's wing is locomotor, while secondarily the wing may serve in respiration What are secondary functions may at times or in certain animals become primary, thus the allantois is an unimportant bladder in frogs, in birds and reptiles it is the chief fœtal respiratory organ, while in many mammals it forms part of the placenta With the change in function, and consequently in form and structure, are correlated changes in various other organs, hence any change in one organ is of far-reaching importance to the whole organism. See BIOLOGY, PHYSIOLOGY, FUNCTION CHANGE

FUNCTION A mathematical term due to Leibnitz (1692), but first defined in its present sense by Johann Bernoulli (1718) In this sense a function is a quantity whose value depends upon that of another quantity E g, in the formula for the circumference of a circle, $c = 2\pi r$, c depends upon r for its value, c is therefore said to be a function of r Likewise, in the equation $y = x^2 + 2x + 3$, the value of y depends upon the value of x, so that if $x = \ldots -2, -1, 0, 1, 2,$ etc, $y = \ldots 3, 2, 3, 6, 11,$ etc, y is therefore a function of x, and this is expressed by the symbol $y = f(x)$, which was first employed almost simultaneously by Euler (1734) and Clairaut Instead of $f(x)$ other symbols are often used, as $F(x)$, $\phi(x)$, $\psi(x)$, etc In $y = f(x)$, the value of y depending upon that of x, x is called the *independent* and y the *dependent* variable In

a function like $y = ax + b$, y is called an *explicit* function of x, in the expression $x^2 + 2xy + b = 0$, y is an *implicit* function, and this is indicated by the symbols $f(x, y) = 0$ In the same way we may have $f(x, y, z) = 0$, $f(x_1, x_2, \quad x_n) = 0$, or we may have $z = f(x, y)$, $y = f(x_1, x_2, \quad x_n)$ If a function has only one value for each given value of the variable, it is called a *uniform* (monodromic, monotropic, *eindeutig*) function, as in the case of $y = x^2 + 2x + 3$ But if a function has more than one value for any given value of the variable, or if its value can be changed by modifying the path in which the variable reaches that given value, the function is said to be *multiform* (polytropic, *mehrdeutig*), as in the case of $y = \sqrt[n]{x}$. If the equation $y = f(x)$ is solved for x, then x will equal some function of y, i e $x = \phi(y)$, and the latter function is called the inverse of the former E g, in the case of a sphere $v = f(r) = \frac{4}{3}\pi r^3$ and $r = \sqrt[3]{\frac{3v}{4\pi}} = \phi(v)$,

$v = f(r)$ and $r = \phi(v)$ being inverse functions

Functions were classified by Leibnitz as algebraic and transcendental The former are such as include only the four fundamental operations, together with the use of constant exponents, their simplest forms being $a + x$, ax, $\frac{a}{x}$, x^a, and their most general form being

$$\frac{(a + bx + cx^2 + \qquad)^m}{(a' + b'x + c'x^2 + \qquad)^{m1}}.$$

In the broadest sense we say that y is an *algebraic* function of x when $A_0y^n + A_1y^{n-1} + A_2y^{n-2} + \quad + A_{n-1}\,y + A_n = 0$, where A_i is a polynomial in x of the form $A_i = a_0x^m + a_1x^{m-1} + \quad + a_{m-1}\,x + a_m$ The *transcendental* functions include all other functions, to which, from the domain of the common operations, powers with variable exponents, the so-called *exponential* functions and their inverse, *logarithms*, chiefly belong

An important class of transcendental functions are known as circular functions These include the goniometric functions, $y = \sin x$, $\cos x$, $\tan x$, $\cot x$, etc (see TRIGONOMETRY), and their inverses, the *cyclometric* functions, $x = \sin^{-1} y$ or arcsin y, etc. It is shown in trigonometry that $y = \sin x = \sin(x \pm 2k\pi)$, where k is any integer, so that x may be increased or decreased by 2π, 4π, 6π, . . without altering the value of y, the function is then called *simply periodic* In the inverse function, $x = \sin^{-1}y$, x evidently may have, for any value of y, an infinite number of values, this function is therefore called *infinitely multiform* The inverse exponential function (i e, the logarithm) and the circular function are integrals of algebraic functions Thus,

$$\int\frac{dx}{x} = \log x, \quad \int\frac{dx}{\sqrt{1-x^2}} = \sin^{-1}x,$$

$$\int\frac{dx}{1+x^2} = \tan^{-1}x, \quad \int\frac{dx}{x\sqrt{x^2-1}} = \sec^{-1}x,$$

etc, all with the proper constants

If a function $y = f(x)$, or $\phi(x, y) = 0$, is plotted, the figure is a curve with infinitely many points in immediate succession The continuity of the curve and, corresponding to it, the continuity of the function, consist in this that any two successive points lie infinitely near each other, so that an infinitely small variation of the abscissas is attended by an infinitely small variation of the ordinates This suffices to explain what is meant by a *continuous* function, the meaning of the term "*discontinuous* function" being easily inferred E g, the functions $a + x$, ax, a^x, $\sin x$, $\cos x$ are continuous in the domain $(-\infty, +\infty)$ of the variable x, as is also x^n when n is a positive integer The functions $\sqrt{x}$, $\log x$ are continuous in the domain $(0, +\infty)$ The function $\frac{a}{x^n}$, where n is a positive integer, is continuous in the domains $(-\infty, 0-\epsilon)$, $(0+\epsilon, +\infty)$, however small ϵ may be, but for $x = 0$ it breaks its continuity and $y = \pm\infty$

The term "theory of functions" was first used by Lagrange (*Théorie des fonctions analytiques*, Paris, 1797) The branch thus denoted deals with functions of more general form than those described above E g, in the equation $w = f(z)$, z must, in general, be taken to be a complex number (q v), $x + yi$, where i stands for $\sqrt{-1}$ The theory, therefore, has for its object the study of functions of one or more variables, in which either the variables or the coefficients, or both, are complex numbers This general theory may be said to have been founded by Lagrange (1772, 1797, 1806), although Newton, Leibnitz, Johann Bernoulli, Clairaut (1734), D'Alembert (1747), and Euler (1753) had already worked towards it Gauss contributed to the theory, especially in its application to the fundamental theorem of algebra Cauchy, starting from Lagrange's work, greatly developed it, and numerous propositions due to him are found in the various textbooks on the subject His memoirs extend over a period of nearly 40 years (1814–51), covering a large part of the general theory as known to-day and placing the subject upon a firm foundation The historical development after Cauchy's time becomes interwoven with that of special functions, notably the elliptic and Abelian

Elliptic functions arose from the consideration of the integral $\int\frac{Rdx}{\sqrt{X}}$, where R is a rational $f(x)$ and X is the general rational and integral quartic $a_0x^4 + a_1x^3 + a_2x^2 + a_3x + a_4$ The theory of these functions had been suggested by Jakob Bernoulli (1691) and by Maclaurin (1742), and D'Alembert (1746) had approached it Euler had gone further (from 1761) and had prophesied (1766) that there would come "a new sort of calculus of which I have here attempted the exposition of the first elements" To Landen (1775), however, the honor is usually given of founding the theory But it is to Legendre that its real development is due He worked 40 years in perfecting it, his labor culminating in his *Traité des fonctions elliptiques et des intégrales Euleriennes* (1825–28) At the same time that Legendre published this work, Abel and Jacobi began their great contributions Abel, whose fundamental theorem was not published until after his death, discovered the double periodicity of elliptic functions Jacobi created a new notation and gave name to the "modular equations" of which he made use Cayley contributed to the subject in England, his only book being devoted to it

The general theory of functions has received its present form largely from the works of Cauchy, Riemann, and Weierstrass Endeavoring to subject all natural laws to mathematical interpretation, Riemann attacked the subject from

the standpoint of the concrete, while Weierstrass proceeded from a purely analytic point of view Riemann's theories have been elaborated by Clebsch, and also by Klein, who has materially extended the theory of Riemann's surfaces and who has generalized Clebsch's application of modern geometry to the study of elliptic functions in his *Theorie der elliptischen Modulfunctionen* This last-named theory had its origin in a memoir of Eisenstein (1847) and in the lectures of Weierstrass on elliptic functions

In the theory of functions the number of special functions is very great For the list at the present time, consult Muller, "Mathematische Terminologie," in *Bibliotheca Mathematica* (Leipzig, 1901), where some 200 are mentioned The most notable work on the historic development of functions is that of Brill and Noether, "Die Entwickelung der Theorie der algebraischen Functionen in alterer und neuerer Zeit," in *Jahresbericht der deutschen Mathematiker Vereinigung*, vol ii (Berlin, 1894) For theory, bibliography, and historical notes, consult Harkness and Morley, *Theory of Functions* (New York, 1893), and Forsyth, *Theory of Functions* (Cambridge, 1893) For further bibliography of historical development and for articles on the theory of functions, consult Merriman and Woodward, *Higher Mathematics* (New York, 1896), Osgood, *Lehrbuch der Funktionen-theorie* (2d ed, ib, 1912), Burkhardt, *Theory of Functions of a Complex Variable* (ib, 1913), Kennelly, *Complex Hyperbolic and Circular Functions* (2 vols, Cambridge, Mass, 1914)

FUNCTION CHANGE The disuse of an organ for one function and its modification for the performance of another, thus an organ may be transformed into another homologous with it, but performing a different function, serving a quite different use It originates in a series of functions performed by one and the same organ. Of these several functions one is the chief or primary, while the rest are secondary If the primary function is for any reason suppressed, some one of the secondary functions becomes the chief one, and the final result of these processes is the transformation of the organ

As an example may be mentioned the change of function in the anterior limbs of certain crustaceans from swimming and breathing uses to organs of mastication (mandibles, maxillæ, and maxillipeds), the outer division, or "expodite," undergoing reduction from disuse Thus the original or chief function is suppressed, and what was an accessory or minor function becomes the chief one More apparent examples are the change from the five-toed legs of the reptilian ancestor of birds into the wings, and of the forelegs of the ancestors of whales into the paddles of existing cetaceans All such changes of function are the result of change of environment, of habits, and of instincts

Still another good example of the principle of change of function is afforded by the swimming bladder of fishes This in most fishes is a closed sac lying directly beneath the backbone In the gar pike it has acquired a connection by a duct with the throat It then becomes an accessory breathing organ in such fishes as the *Protopterus* of Africa, which is able temporarily to live out of water Finally, by further change in habit and structure, this bladder with its pneumatic duct has become transformed into the lung of the amphibians, reptiles, and higher vertebrates The transformation is due to change of surroundings and of habit, resulting in the changes of function

This principle is pure Lamarckian doctrine, i.e, that changes of surroundings and of habits bring about changes of function or use, and finally of structure Yet there are very numerous examples of this principle, and it has been most active in the origination of the classes and orders of animals Consult many of the books under EVOLUTION

FUNC'TUS OFFI'CIO (Lat, discharged from duty or authority) A phrase applied to something which, having formerly had legal vitality and force, is without any further validity or authority When an agent or officer has fulfilled the duty assigned him, his office is *functus officio* and his powers are at an end The same is true of legal instruments which have been duly executed and have been used for the purpose for which they were created, or on which a judgment has been entered Thus a warrant of attorney on which a judgment has been entered is *functus officio*, and a second judgment cannot be based upon it So, also, a bill of exchange paid by the drawee, or passed by him to the credit of the drawer, is *functus officio*, and cannot be further negotiated

FUNDAMEN'TALS OF CHRISTIAN DOCTRINE A term much used in Protestant theological discussion, but very difficult to define The church down to recent times has usually defined the fundamental Christian doctrines as those which it is necessary to believe in order to attain salvation But this logically involves conclusions concerning the condemnation of large classes of individuals which men, particularly in the later time, shrink from accepting A distinction has been drawn between truths necessary to salvation and the degree of knowledge necessary in an individual in order that he may be saved That is, a truth may be necessary to salvation, yet an individual who does not know it may not be condemned, it being assumed that he would believe it if he knew it. It is not involuntary ignorance of the truth, but rejection or denial of it, that results in condemnation Hence the fundamentals vary for individuals, and it is impossible to draw up a certain definite list which shall hold good in all cases A more scientific definition is that the fundamental Christian doctrines are those which are the essential characteristics of Christianity, differentiating it from other religions All Christians consider certain truths essential to the Christian system, and others as comparatively unessential But each Christian body has doctrines essential to its own system which are not held by the entire Christian Church And a distinction must be made between doctrines fundamental to Christianity and those fundamental to a particular system Adherents to the various bodies do not always find it easy to draw this distinction, and the best attempts to state the former in terms of doctrine almost inevitably prove unsatisfactory because of the natural tendency to include the latter In general, however, there is a practical tendency towards agreement between the different Protestant churches, whatever differences there may be upon specific points in their statements of fundamentals of doctrine, and such agreement is increasingly recognized Modern Protestantism denies that saving faith is an exercise of the intellect, it is an action of the will in respect to what is known The characteris-

tics of Christianity are to be found in the sphere of conduct rather than in belief Roman Catholic theologians claim that they do not use the expression

The discussion of fundamentals in doctrine has had importance chiefly in attempts to unite the various Christian bodies, particularly the Lutheran and Reformed churches It was actively carried on in Germany in the early post-Reformation period In England a committee of clergymen was appointed in 1653 to draw up a list of "fundamentals" and report to Parliament Richard Baxter, who was one of the committee, proposed that it should consist of the Apostles' Creed, the Lord's Prayer, and the Ten Commandments A catalogue of 16 articles was adopted, however, including doctrines concerning God, Christ, divine worship, faith, sin, the resurrection, the judgment, everlasting life, and everlasting condemnation The aim seems to have been to exclude rather than to furnish common ground for agreement The Federal Council of the Churches of Christ in America (1908), while not professing to form a creed, so defines itself as to make belief in "Jesus Christ as Divine Lord and Saviour" the fundamental Many would regard the fundamental to be a belief in Jesus Christ as the highest revelation of God

FUNDI See FONDI

FUNDI, fŭn'dĭ, or FUNDUNGI (West African word) A kind of grain, *Paspalum exile,* much cultivated in the west of Africa It is allied to the millets and still more nearly to some of the kinds of grain cultivated in India It is wholesome and nutritious, and has been recommended as a light and delicate food for invalids The natives of western Africa throw it into boiling water, pour off the water, and add palm oil, butter, or milk In Sierra Leone it is much used with stewed meat and sometimes made into porridge with milk See PASPALUM

FUNDY, BAY OF (from Fr *fond de la baie,* head of the bay) An arm of the Atlantic, separating Nova Scotia from New Brunswick and the State of Maine (Map Nova Scotia, D 4) With an average breadth of 35 miles, it extends 180 miles in length from northeast to southwest It forks, at its head, into two inlets, the northern, called Chignecto Bay, and the southern, Minas Channel, which are divided by narrow necks of land from Cumberland Strait Along its northwest side it receives the St John, the principal river of New Brunswick, and the St Croix, which, through its entire course, forms the international boundary The navigation is rendered perilous by frequent summer fogs and by the peculiarity of the tides, which have a rise and fall of 53 feet at certain seasons, producing dangerous bores in the upper reaches The shores present a very bare appearance at low tide, with long expanses of mud flats and estuaries completely drained Consult W B Dawson, *The Currents at the Entrance of the Bay of Fundy* (Ottawa, 1905)

FUNEN, fu'nen (Dan *Fyen*) The largest of the Danish islands after Zealand, situated between Zealand on one side and Jutland and Schleswig on the other (Map Denmark, D 3) It is about 50 miles long and over 40 miles in its greatest width, with an area of 1133 square miles Its surface is slightly elevated in the south and west, where it rises to an altitude of over 400 feet The larger part, especially in the north and east, however, is flat The soil is extraordinarily fertile and well watered Grain is produced and considerable amounts are exported Stock farming is also extensively carried on Administratively the island forms, together with the adjacent islands of Langeland and Æro and a number of smaller islands, the Province of Funen, which is divided into the two districts of Odense and Svendborg The principal towns are Odense (q v), the capital, Svendborg, and Nyborg (q v) Pop (district) 1901, 279,785, 1911, 203,179 Pop (island), 1901, 240,359, 1911, 252,288

FU'NERAL, THE, OR GRIEF À-LA-MODE. A comedy by Steele, acted in 1701

FUNERAL RITES. See MORTUARY CUSTOMS

FUNES, foo'nās, GREGORIO (1749–1830) An Argentine historian He was rector of the University of Córdoba, and as such introduced numerous reforms He was highly distinguished as a lecturer, and counted among his pupils many men afterward famous He was also celebrated as an historian and pulpit orator, and in the latter capacity was probably unexcelled in his day in South America His qualifications ultimately secured for him an appointment to the deanship of the cathedral of Córdoba His chief publication is entitled *Ensayo de la historia civil del Paraguay, Buenos Ayres y Tucumán* (Buenos Aires, 1816, 2d ed, 1856). His other works are *Plan de estudios para la universidad de Córdoba* (Córdoba, 1832) and *Examen crítico de los discursos sobre una constitución religiosa, considerada como parte de la civil* (Buenos Aires, 1825) Consult M. de Vedia y Mitre, *El Dean Funes en la historia argentina* (2d ed, Barcelona, 1910)

FÜNFKIRCHEN, funf'kĕrk-en, or PÉCS, pāch The capital of the County of Baranya, Hungary, and an important garrison town, 248 miles southeast of Vienna by rail (Map Hungary, F 3) It is picturesquely situated on the southern vine-clad slopes of the Meczek Mountains It has been the see of a Roman Catholic bishop since 1009 and has a handsome eleventh-century Romanesque cathedral with four towers, which has been restored since 1887 Two of the five Turkish mosques from which the town derives its German and Hungarian names are in ruins, but two have been converted into the Stadtkirche and the third Franciscan church Other important buildings are the episcopal palace, the town hall, and a fine synagogue Its many institutions of learning include a Catholic seminary, a priests' college, a gymnasium, a teachers' institute, a trade school, a military school, a museum, and a library It has a large majolica factory There is a considerable trade in the coal, marble, wine, fruit, tobacco, and hogs of the adjacent territory, and it has important manufactures of leather, cloth, pottery, champagne, and church organs Funfkirchen is thought to be the Roman Colonia Serbinum It was occupied by the Turks from 1543 to 1686 Pop, 1900, 42,252, 1910, 49,822

FUNG See FUNJ

FUNG-HUANG, or **FENG-HWANG,** fŭng'-hwang' A fabulous Chinese bird which figures largely in Chinese poetry, art, and folklore *Fung* is the male and *huang* the female, and as the two are inseparable they are considered models of conjugal love The fung-huang is the second of the four supernatural creatures of Chinese mythology and has many symbolical analogies to the Greek phœnix It is im-

mortal, lives in the highest air, and its appearance on earth presages the advent of a virtuous monarch or is emblematic of a prosperous reign It appeared several times in antiquity In China it used to be the special emblem of the Empress, in Japan (where it is called Hō-wō), of the Mikado In art it is usually depicted with the head of a pheasant, the beak of a swallow, a long flexible neck, plumage of many gorgeous colors, a flowing tail, and long claws pointed backward as it flies Each of the five colors of its plumage typifies one of the five cardinal virtues The flowers usually associated with it are sprays of the tree peony Consult Mayers, *Chinese Reader's Manual* (Shanghai, 1875), Griffis, *The Mikado's Empire* (New York, 1900), Macgowan, *Chinese Folk Lore Tales* (London, 1910), Griffis, *China's Story in Myth, Legend, Art, and Annals* (New York, 1911)

FUNGI, fŭn'jī (Lat, mushrooms, connected with Gk σφόγγος, *sphongos*, σπόγγος, *spongos*, sponge) There are in use two applications of the term "fungi." In general, fungi are regarded as including all thallophytes (q v) without chlorophyll, i e, unable to manufacture food In scientific usage fungi apply only to that assemblage of dependent thallophytes which has the characteristic vegetative body called a mycelium A mycelium consists of colorless filaments, usually more or less interwoven It may be very open and delicate, like a spider web, or it may be felt-like, or even form a compact body (as in lichens) Since fungi are unable to manufacture carbohydrate food, they are either parasites, dependent upon living plants or animals as hosts, or they are saprophytes, dependent upon organic débris or products from plants or animals These are not terms of classification, for some fungi are able to live either as parasites or saprophytes, and such are called facultative forms, while those restricted to either the parasitic or saprophytic habit are obligate forms

Three groups of fungi are recognized Phycomycetes (alga-like fungi), Ascomycetes (sac fungi), and Basidiomycetes (basidium fungi) In all of these groups the mycelium establishes absorbing connections with its food supply (substratum), and when these connections are definite and more or less specialized, they are called haustoria (suckers) In the case of the parasite the substratum is either the surface or the internal tissues of the host, and in such cases the haustoria are very definite structures Under certain conditions the mycelium also produces vertical branches (sporophores) which in a variety of ways give rise to spores In the case of internal parasites the sporophore reaches the surface of the host in a position favorable for spore dispersal Fungi are notable for the vast number of spores produced, and in most cases their dispersal is aerial, so that mycelia are multiplied with great rapidity and over wide areas

Phycomycetes—This comparatively small group of fungi resembles the green algæ in many features, a fact which has suggested the name The mycelium is peculiar among fungi in being cœnocytic, i e, in having no cross walls, the whole body of the mycelium having one continuous cavity The striking resemblance to algæ, however, consists in the presence of conspicuous sex organs The two groups of Phycomycetes are distinguished by their sexual characters the Oomycetes, which are heterogamous, i e, with distinct eggs and sperms, and the Zygomycetes, which are isogamous, i e, with gametes similar

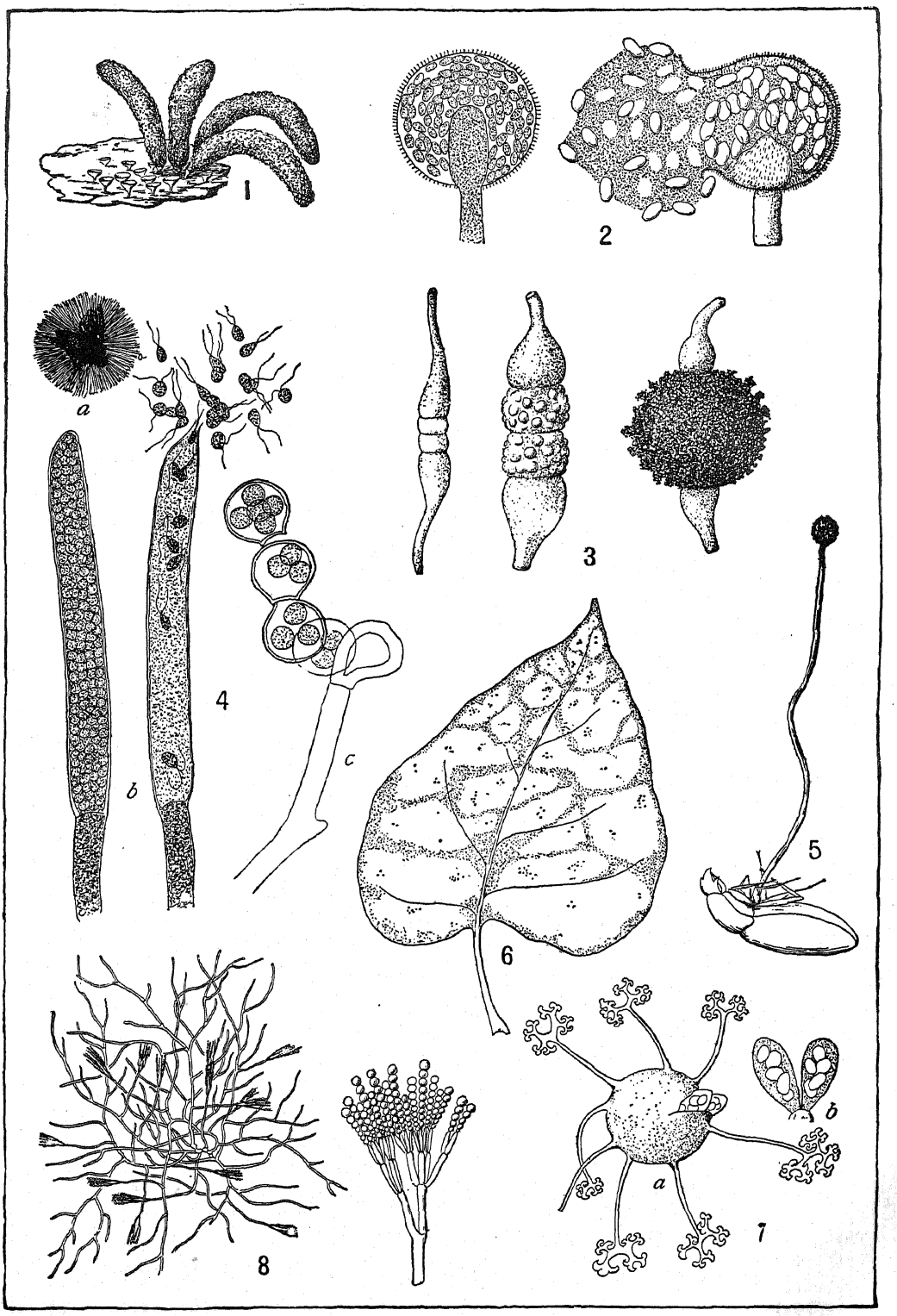
The Oomycetes are regarded as more primitive than the Zygomycetes, because they are more closely related to the algæ They are mostly aquatic and produce zoospores, differing in this feature from the Zygomycetes, in which aerial, wind-dispersed spores are produced The water molds (Saprolegniales) are the best representatives of the group The genus *Saprolegnia* contains saprophytic species found on dead bodies of crustaceans, water insects, etc, and also parasitic species attacking fishes, frogs, etc One species that attacks the eggs and young of fishes is very destructive in fish hatcheries *Saprolegnia* is noted for the frequent and perhaps usual occurrence of parthenogenesis, which means that its eggs germinate without fertilization The downy mildews (Peronosporales) constitute another group of Oomycetes, which merges into the Zygomycetes They are the one assemblage of Oomycetes with distinctly aerial habit The downy mildews are internal parasites, many of them destroying valuable crop plants Among the conspicuous genera are *Albugo*, which is very common as white rust upon members of the mustard family, *Phytophthora*, which is the parasite producing potato rot, *Plasmopara*, one of whose species is the grape mildew, a disease of American origin, *Peronospora*, whose species are very common parasites on ordinary vegetables, as peas, beans, spinach, etc

The Zygomycetes, distinguished by apparent isogamy and by the elimination of swimming spores, are best represented by the black molds (Mucorales), whose characteristic cobwebby, fleecy-white mycelia are very common on decaying material, stale bread, fruit juices, etc Another very common order of Zygomycetes is the Entomophthorales, a group of parasites fatal to insects, the common house fly often being destroyed by them

Ascomycetes—The sac fungi include the majority of fungi, and in contrast with the Phycomycetes the filaments of the mycelium have cross walls and the sex organs are much reduced and often suppressed The common character of this great assemblage is the appearance of an ascus (sac) in the life history, in which the ascospores are formed In the majority of forms a spore case is developed in connection with the asci, more or less investing them with a protective jacket, and called the ascocarp The group is so extensive and varied that only a few illustrations from the eight usually recognized orders can be given The order of the illustrations used will indicate the present opinion as to the relative rank of the forms

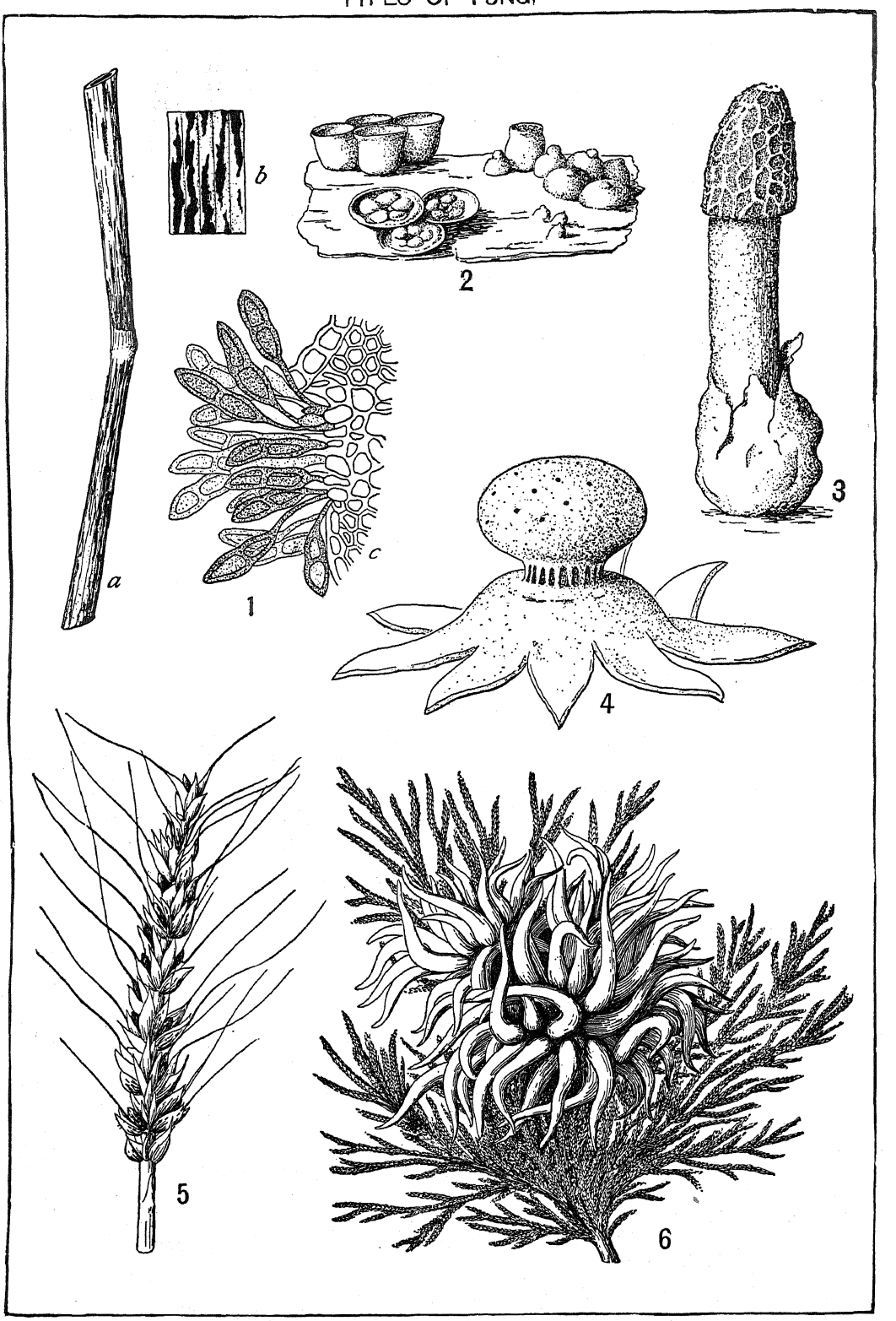
The yeasts (Saccharomycetes) are very familiar forms, which represent the order Protoascales, the name referring to the fact that yeasts are regarded as the simplest or most primitive of the Ascomycetes Then follow orders containing parasites inducing such diseases as peach curl, plum pocket, and witch brooms, and such saprophytes as the well-known edible morel (*Morchella*), whose fleshy ascocarp is usually spoken of as a mushroom One of the largest orders, Pezizales (cup fungi), is characterized by the open ascocarp, which takes the form of a flat disk, bowl, cup, or funnel. The cups are sometimes brightly lined as in the case of the

TYPES OF FUNGI



1. SPORE CASES OF A SLIME MOLD.
2. SPORANGIA OF BLACK MOLD.
3. DEVELOPMENT OF ZYGOSPORE OF BLACK MOLD.
4. WATER MOLD, (a), growing on a fly; (b), Sporangia with Zoöspores; and (c), Oögonia and eggs.
5. SPORE CASE OF CORDYCEPS (an insect parasite).
6. MILDEW ON LILAC.
7. LILAC MILDEW, showing (a), Ascocarp, and (b), Asci with spores.
8. GREEN MOLD WITH SPOROPHORES.

TYPES OF FUNGI



1 WHEAT RUST, Showing (a) breaking out on a stem; (b), portion of stem enlarged; and (c), group of Teleutospores.
2. NEST FUNGUS.
3. STINKHORN.
4. EARTH STAR
5. WHEAT SMUT.
6. CEDAR APPLE.

common scarlet cup of the woods To this same order also belong the fungi that produce lichens, upon which the characteristic disklike or cuplike ascocarps are seen more commonly Other orders contain the truffles, which are entirely subterranean fungi whose ascocarps are tuberlike, becoming fleshy and edible, and also the common blue and green molds, such as appear on bread, preserves, etc The largest order is Pyrenomycetales, or fire fungi, the common name referring to the fact that these fungi often form black spots, knots, etc, resembling charred places upon twigs and decaying wood The order consists of two well-defined groups, the mildews and the black fungi The mildews are superficial parasites on the higher plants, the cobweblike mycelium especially running over leaves, as in the case of the common lilac mildew The black fungi constitute the fire fungi proper, and the name suggests their appearance They include both parasites and saprophytes Two of the best-known parasites among the black fungi are the black knot (*Plowrightia*), a destructive disease that attacks the plum and cherry, and the ergot fungus (*Claviceps*), a common parasite on the young ovaries of grasses, especially rye At a certain stage of its life history the ergot fungus forms a compact mass of tissue from which the astringent drug ergot is extracted

Basidiomycetes—This great group of fungi is characterized by the occurrence of a basidium in the life history, which is a cell that gives rise to slender branches, usually four in number, at the tip of each one of which a spore is cut off (basidiospore) There are two great divisions of Basidiomycetes, the first one being represented chiefly by the smuts and rusts, and the other being characterized chiefly by the mushrooms and puffballs The smuts (see USTILAGINALES) are more commonly called brand fungi in Europe, and are destructive parasites that attack various cereals, conspicuous among which is the corn The rusts (see UREDINALES) are all destructive parasites, ranging widely among seed plants, the best-known forms being the wheat rusts The rusts are especially remarkable for their polymorphism, in extreme cases a single life history including two parasites living upon entirely unrelated host plants and producing at least five different kinds of spores Associated with smuts and rusts in the first group of Basidiomycetes are two other orders, the best-known representative being the ear fungi, which appear as gelatinous earlike growths on bark, etc, a very common form occurring on stems of elder

The second group of Basidiomycetes includes 10 orders, which are divided between two groups Hymenomycetes, in which the basidia are freely exposed, and Gasteromycetes, in which they are inclosed by a characteristic sporophore The most representative order of Hymenomycetes is the Agaricales, which is by far the largest group of fleshy fungi, containing most of the so-called mushrooms and toadstools There are three conspicuous families of mushrooms, based upon the character of the special surface upon which the spore-forming basidia are exposed While the sporophore usually has the ordinary mushroom (umbrella) form, with its stipe and pileus, it develops also in various bracket forms, and even as incrustations upon the surface of logs, etc The tooth fungi (Hydnaceæ) are those in which the basidium layer covers toothlike or spinelike processes. The pore fungi (Polyporaceæ) are those in which the basidium layer lines tubes that terminate on the surface in porelike openings The gill fungi (Agaricaceæ) are the common mushrooms and toadstools, whose basidium layers are exposed upon the characteristic bladelike plates which are the gills

The Gasteromycetes are the most highly organized of the fungi, whose sporophore is differentiated into an outer zone (peridium) and an inner mass of tissue (gleba), in which there are numerous chambers lined by the basidium layer In addition to the true puffballs, which are the most representative of the group, there are the curious nest fungi and the stinkhorns

In addition to the true fungi considered above, there are other groups of thallophytes without chlorophyll which are commonly associated with fungi in an elementary presentation of thallophytes The two most conspicuous groups of this kind are as follows

Myxomycetes—These are the slime molds or slime fungi, which combine characters of plants and animals in such a way that opinions differ as to which they should be assigned Those that incline to the view that they are animals use the term Mycetozoa (fungus animals) for the group In general they are common in forests on rich soil, decaying wood, fallen leaves, etc, and one of the largest occurs on spent bark (flowers of tan) The characteristic plant body is called a plasmodium, which is a naked mass of protoplasm with a creeping motion, putting out and withdrawing regions of its body (pseudopodia) like a gigantic amœba The most unplant-like behavior of the plasmodium is its habit of engulfing solid food instead of admitting it in solution Under certain conditions the plasmodium passes into a spore-forming stage, usually numerous stalked sporangia being produced from a single plasmodium These sporangia produce countless spores with cellulose walls, which are very characteristic reproductive cells of plants

Schizomycetes—These are the well-known bacteria (q v) The group has many characters in common with the blue-green algæ and is now generally associated with them in the group Schizophytes The chief characters in common with the blue-green algæ are the one-celled body, which often forms filaments, a protoplast of simple structure, the power of locomotion, and reproduction only by vegetative multiplication, the cell divisions being in remarkably rapid succession The immense economic importance of bacteria has stimulated their investigation to such an extent that bacteriology has become a distinct field of research They are of great interest to the botanist as representing a group of plants in which there is extremely varied physiological differentiation and very little morphological differentiation This means that in most cases a species is distinguished, not by its appearance, but by its activities On the basis of activities, four conspicuous groups of bacteria are usually considered The saprophytic bacteria are forms that attack the dead bodies or the organic products of plants and animals and bring about putrefaction and fermentation The pathogenic bacteria are the disease-producing forms, their activities being connected with living organisms The nitrogen bacteria are bacteria of the soil that are able to utilize the free nitrogen of the air and are the medium through which a steady supply of

nitrogen salts enters the soil The nitrifying bacteria are also soil forms that lay hold of the simpler nitrogen compounds (as ammonia) and oxidize them into the nitrites and nitrates which are the nitrogen compounds available for green plants

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FUNGI, ECONOMIC Species of fungi that may directly or indirectly affect man's welfare Of those that affect man directly, the edible and poisonous species and some parasites, such as ringworm, barber's itch, etc, may be mentioned as examples (see FUNGI, EDIBLE AND POISONOUS, MUSHROOM, TRUFFLE), of those that affect him indirectly are plant diseases, molds, some animal diseases, etc, whose functional activity may result in monetary or some other kind of loss A large majority of fungi (saprophytes) are capable of living only on decaying organic matter, and since they do not ordinarily attack living plants, they do not produce plant diseases They are therefore of little economic importance except as they occur on fruits and other food stuffs, timber, clothing, etc, when they may be considered harmful On the other hand, many of these organisms are more or less beneficial, since they act as scavengers in the destruction of organic matter which would long cumber the earth if dependent upon the slow process of chemical oxidation Under abnormal conditions of moisture, temperature, etc, some saprophytic fungi (usually called facultative parasites) are able to attack and injure living plants The parasitic species (another large group) occur normally upon living plants and animals, from which they derive their sustenance The plant or animal upon which they live is called the host The relationship between host and parasite is more or less intimate, and as the economic plants are affected, the importance of the parasite is the greater In some cases the fungi are of positive benefit to man because they (entomogenous fungi) destroy noxious insects, as locusts, grasshoppers, flies, scale insects, etc, others live at the expense of fungi that are themselves injurious to plants of value to man, as in the case of *Darluca filum*, a parasite of the injurious asparagus rust. The number of fungi that attack living animals is large, and in some cases the attack is very destructive Young fish in hatcheries are subject to diseases due to fungi, and higher animals often suffer similar attacks A lung disease of horses is caused by the presence of the fungus Botriomyces, and the various forms of ringworms, favus, barber's itch, etc, are all due to fungi

When mention is made of fungus diseases the term commonly refers to diseases of plants caused by attacks of parasitic fungi The number of species of such parasitic fungi is very large, and nearly every garden, orchard, and greenhouse crop may be attacked by one or many The various parts of the maize plant are subject to the attack of at least 70 species of fungi, the common tulip tree, or yellow poplar, is reported as the host of nearly 100 species, the oat plant has a dozen such enemies, and so on The annual loss attributed to the attacks of fungi, to which the reduced yield and inferior quality of the product are largely due, amounts to hundreds of millions of dollars It has been estimated that the average loss due to oat smut in the United States alone amounts to more than $18,000,000 annually If to this sum be added the similar losses of other great economic crops, the total would be enormous Cereal rusts in the United States are believed to cause more loss than any other source of injury, and often the loss amounts to more than the damage done by all other enemies, fungus and insect, added together In certain localities the grape crops have been almost wholly destroyed by parasitic fungi, and certain truck crops have suffered similarly The great famine in Ireland during 1846–47 has been largely attributed to the almost total destruction of the potato crop, through the attack of the potato rot (*Phytophthora infestans*)

For the general classification of the fungi, see article FUNGI Fortunately many of the diseases caused by these parasites may be prevented by the adoption of certain precautionary measures, by the application of a fungicide (q v), and by the exercise of proper methods of cultivation by which the general vigor of the plant is improved See DISEASES OF PLANTS; also diseases of specific crops, eg, APPLE, GRAPE; POTATO, WHEAT, MAIZE, ETC

FUNGI, EDIBLE AND POISONOUS A general name given to mushrooms, toadstools, puffballs, etc, that may or may not be eaten with safety by man

Edible Fungi. More than 700 species have been found to be safe and many are considered very nutritious (See MUSHROOM) Perhaps the principal reason that fungi are not more generally eaten is not so much that their value is unknown, as that people are afraid even to touch the plants because certain species are known to produce illness and even death In the interests of safety, therefore, every writer upon the subject of edible and poisonous fungi iterates the warning to avoid eating any fungus the edible qualities of which are not positively known to the would-be consumer beyond the slightest shadow of doubt. Since certain toadstools (especially *Amanita phalloides* and *Amanita muscaria*, described below) are mistaken by the uninitiated for the common mushroom, all fungi found in the woods or in shady places (until they are proved to be wholesome) and all that have white or yellow gills should be avoided the common mushroom grows in the open fields and has pink gills which gradually turn to purplish brown or black A safe plan for the novice to adopt, even on becoming familiar with the 12 edible species described and illustrated, after being satisfied with their identification, is to eat only a small portion of a fungus new to him, to note the results carefully, and to allow several hours to elapse before indulging more freely In no case should he be guided by pleasant taste alone, because some of the species considered unwholesome do not manifest any disagreeable quality

1. Chanterelle (*Cantharellus cibarius*), common in light woods and on high ground, grows from 2 to 4 inches tall, expands from 2 to 3 inches, and has an irregular lobed orange or

EDIBLE FUNGI

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1 CHANTERELLE – CANTHARELLUS CIBARIUS
2 COMMON FIELD MUSHROOM – AGARICUS CAMPESTRIS
3 EDIBLE PORE MUSHROOM – BOLETUS EDULIS
4 VARIABLE MUSHROOM – RUSSULA HETEROPHYLLA
5 OYSTER MUSHROOM – AGARICUS OSTREATUS
6 FAIRY RING MUSHROOM – MARASMIUS OREADES
7 MOREL – MORCHELLA ESCULENTA
8 CLAVARIA CINEREA
9 HORSE MUSHROOM – AGARICUS ARVENSIS
10 CORTINARIUS COERULESCENS
11 HORSE-TAIL FUNGUS – COPRINUS COMATUS
12 LIVER-FUNGUS – FISTULINA HEPATICA

yellow cap, which when young is domelike, but with age becomes expanded and depressed at the centre The gills are thick, short, branching, and wide apart The stem, at first white and solid, later becomes hollow Since this species is rather tough and dry, only crisp heavy specimens should be selected for the table A closely related poisonous species, *Cantharellus aurantiacus*, found in rank or decaying grass, closely resembles the above in color, but has thin, crowded gills of deeper tint than the cap 2 The common field mushroom (*Agaricus campestris*), which grows from 2 to 4 inches tall, is probably the commonest, best known, and most easily distinguished of all It is the only one that is cultivated to any extent (See MUSHROOM) The cap is fleshy, from 1¼ to 4 inches broad, usually white, but sometimes tawny or brownish above, and, when in prime condition, pink below With age it changes to dark brown Upon the stem is a collar, the remains of a veil, which in the young mushroom joins the margin of the cap to the stem This mushroom has never been found growing in woods or shady places, but always in open pastures, fields, and lawns 3 The edible pore mushroom (*Boletus edulis*), found most abundantly during the autumn in pine, oak, and chestnut woods, has a brown white-fleshed cap from 4 to 6 inches across, with convex tubes at first white, but changing to yellow and then greenish When in the pale-yellow stage the plants are most tender and edible The 2 to 6 inch stem becomes light brown, with a network of pinkish veins near the top 4 The variable mushroom (*Russula variata*), a common species found in woods from July to November, is usually some shade of dingy green, never reddish or purple The stem is white, solid, and firm, the gills white, narrow, crowded, forked The fleshy cap when peeled is white, of firm texture, and mild, sweet, nutty flavor while young and fresh, wilted and old specimens are not desirable even when free from grubs, which are especially fond of the plant 5 Oyster mushroom (*Pleurotus ostreatus*), common on moist, decaying tree trunks throughout the United States The cap is shell-shaped, 3 to 5 inches broad, dark when young, soon bleaching to brownish, and later yellow, stem white, short, or wanting, thickened upward, gills broad, rather distant, white or sometimes yellowish Flesh tender, except in old specimens, of pleasant, but not pronounced, flavor Especially good when dipped in egg and fried slowly like an oyster 6 The fairy ring (*Marasmius oreades*) grows in short grass of lawns, pastures, etc, but never in woods Its common name is derived from its habit of growing in ringlike patches, which increase in diameter as the plants reach outward to new feeding ground The mushrooms are small (1 to 2 inches broad and 2 to 3 inches tall), reddish at first, pale afterward, solid, very tough, with broad, distant, free gills, alternately long and short They have a weak but agreeable odor and mild, sweet, and nutty taste, which is retained well when the mushrooms are dried by exposure to air or sun—the simplest way to preserve them It is one of the best and the most easily digested The hairy-foot (*Marasmius personatus*) which grows in woods on dead leaves, etc, must not be mistaken for the fairy ring, since it is generally considered unwholesome This species has darker and narrower gills, and a hairy down at the base of the stem. 7. Morel (*Morchella esculenta*), common in spring in old apple orchards and in woods, especially under butternut trees and on burned-over surfaces or places where wood ashes have been scattered The pale yellow, buff, or tawny cap is attached to the stout whitish hollow or stuffed stem by its base, is ribbed and pitted like honeycomb The morel is one of the most easily recognized and the choicest species of edible fungi Its near relatives (genus *Morchella*), which more or less closely resemble it, are all edible 8 *Clavaria cinerea*, a fungus without a cap, which may be found in the woods from June until frost, grows from 1 to 3 inches high, in tufts or colonies, and has thin or thick stems lighter than the numerous irregular, wrinkled gray branches It is considered the best of the Clavarias, but is said to be injurious in large quantities and to be digested with difficulty by weak stomachs 9 Horse mushroom (*Agaricus arvensis*) is considered by some writers to be a variety of the common mushroom, which grows in similar places, but is slightly larger (2 to 5 inches tall, 3 to 5 inches or more broad), has gills which turn from whitish to pink and then dark brown, and a stem which is either hollow or stuffed with floccose pith By some it is considered inferior and by others superior to the common mushroom 10 *Cortinarius cærulescens*, an almost odorless species found among moss in woods, has a convex or plane yellowish cap 2 to 3 inches across, slightly rounded, thin, closely crowded, blue or purplish gills, which change to a dull cinnamon with age, and firm violet, pale, or whitish stems about 2 inches long, which rise from bulbs more than an inch thick 11 Horsetail fungus (*Coprinus comatus*) may be found after hard rains from August until frost, sometimes in spring, singly or in clusters, in a great variety of places, from rich soil to dumping grounds The cap is fleshy, at first oblong and white, but later a ragged bell shape and purplish black, the gills are crowded, broad, free from the stem, at first white, then pink, after which the plant becomes unfit for food, since it turns from purple to black and dissolves into inklike drops The stem is hollow, often 10 inches long, but mostly hidden under the cap It is not of high flavor, but is of great delicacy when young 12 Liver fungus (*Fistulina hepatica*) is a juicy, red, fibrous-fleshed, nonrooting fungus, which may be found upon decaying trees and stumps, especially on oak, beech, and chestnut, after rains in summer and autumn Under the name of beefsteak fungus it is highly esteemed everywhere for its rich, nutritious flesh of acid flavor and agreeable odor

Poisonous Fungi The number of fungi formerly considered poisonous was very large; investigation, however, has proved that many so regarded are not merely innocuous, but are good for food The results are that not a few old beliefs have been upset and others are made to totter Poisonous fungi may be divided into two groups those that contain local irritant poisons, which quickly act on the alimentary tract, and those that contain poisons which, after the lapse of several hours, act on the nerve centres. Members of the first group, though exceedingly disagreeable in their effects, produce no serious disturbance, and unless eaten in very large quantities or by persons in ill health, need not be considered dangerous The administration of an emetic, followed after ac-

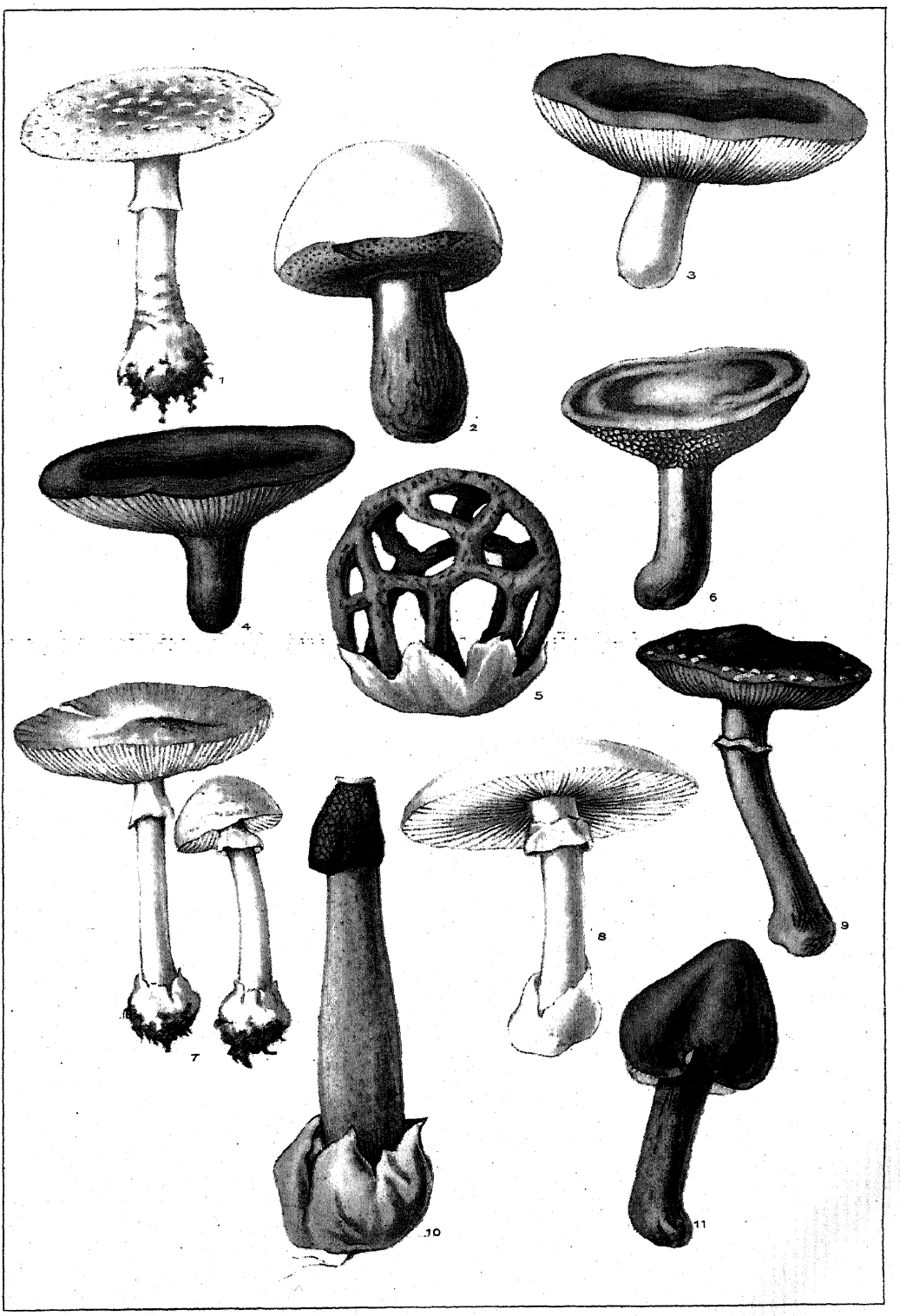
tion by doses of sweet oil and whisky, or sweet oil and vinegar, is recommended Unfortunately members of the second group give no warning of their harmfulness either by an unpleasant taste or by local action on the digestive tract, and toxic quantities of the poison are usually absorbed before symptoms appear Should a poisonous *Amanita* be eaten by mistake or through carelessness, "take an emetic at once and send for a physician, with instructions to bring hypodermic syringe and atropine sulphate The dose is $\frac{1}{180}$ of a grain, and doses should be continued heroically until the $\frac{1}{20}$ of a grain is administered, or until, in the physician's opinion, a proper quantity has been injected Where the patient is critically ill, $\frac{1}{20}$ of a grain may be administered" The treatment is effective only when the first symptoms manifest themselves, and not when late effects of the dangerous toadstool poisons are evident

The species illustrated and described herewith have, until recently, been considered poisonous, but some of them are either merely innocuous, injurious to only certain individuals in the same way that strawberries are, or are even more generally wholesome. Every one, even the fungus expert, should consider himself a novice until he has personally determined these two points

1 Fly amanita or fly mushroom (*Amanita muscaria*), common in woods, especially of pine and birch, has a cap 4 or more inches broad, which, in its varieties, exhibits many colors—blood red, bay brown, orange, lemon, white, and the tint of cooked liver Usually the skin, which is at first thick (sticky in damp weather), checks more or less and peels in angular fragments The flesh is yellow just beneath the skin, otherwise white and rather loose The stem, which is white, scaly, long, stout, but soon hollow, is bulbous at the base and bears a very soft torn frill or ring close to or even at its summit The gills are white, sometimes yellow This species is everywhere reported as poisonous, but is said to be eaten by the Siberians to produce a sort of intoxication Its name, muscaria, is derived from its property of killing flies. 2 Satan's mushroom (*Boletus satanus*) is a somewhat rare species which grows in woods Its cap, 3 to 8 inches across, is usually brownish, yellow, or whitish, and rather sticky tubes yellow, with bright-red mouths, which later become orange, stem 2 or 3 inches long, thick and reticulated above Its flesh, which is whitish, turning to reddish or bluish where injured, is mild, reputed poisonous, but eaten without discomfort by many Since its evil effects seem to vary with the individual who partakes, it should either be avoided or tested with extreme care. 3. The emetic mushroom (*Russula emetica*) has a cap 3 to 4 inches broad, rosy, changing to blood red, then tawny, sometimes yellow at first and later white Its shape changes from bell form to flat, or with a depressed centre, and a furrowed tubular margin The gills are white, rather free, broad, and distant Reputed to be emetic and poisonous, but eaten with impunity by many 4 The woolly lactarius (*Lactarius torminosus*) is a rare species which grows in damp woods and swamps Its cap is 2 to 4 inches broad, at first convex, later concave, usually shining yellowish red, gills narrow, sometimes forked, whitish, tinged with yellow or red, stem, 1 to 2 inches long, lighter than the cap, flesh pinkish, extremely acrid, reputed very poisonous, 5 Trellised clathrus (*Clathrus cancellatus*), a reputed poisonous fungus of beautiful red, white, or yellowish lattice-like form and of very offensive odor The latticed part rises from a white or fawn-colored cup 6 Fiery boletus (*Boletus piperatus*), a common but variable species in woods and open places, is 1 to 3 inches in diameter, yellowish, light brown, or reddish, convex or almost flat, on a stem 1½ to 3 inches tall, reddish or bright yellow at its base The flesh, white or yellowish, loses its acrid, peppery flavor when cooked Though reputed poisonous, this species has been eaten with enjoyment by many 7 Deadly agaric, deadly amanita, death cup (*Amanita phalloides*), a common and very variable species found in woods from June until frost, is one of the most poisonous of mushrooms The cap is 3 to 4 inches across, shining white, lemon, grayish brown, blackish brown, or grayish brown with a black disk sometimes dotted, viscid in damp weather, stem 3 to 5 inches long, sometimes much longer, white and rather smooth, hollow above, larger, solid, and bulblike below, rising from a sort of cup—hence the name "death cup", and bearing near its summit a reflexed, swollen, white, usually entire ring, gills white, free This species is perhaps most dangerous, because most often mistaken for the common mushroom (*Agaricus campestris*) Since it grows in the woods, has white gills, white spores, and a cuplike base, the collector is to blame if he makes any mistake the common mushroom does not grow in the woods, has pink gills, dark spores, and no cup at its base 8 Spring mushroom (*Amanita vernus*), considered to be a variety of the preceding, which grows in similar places, but during spring and summer 9 The verdigris mushroom (*Stropharia ærugynosa*), common from July to November in woods and meadows, has a cap about 3 inches in diameter, covered with a green or blue slime, a long, scaly, hollow, bluish stem, and brown or purplish gills It is reputed poisonous, probably because of its disagreeable odor, color, and taste 10 The stinkhorn or fetid wood witch (*Phallus impudicus*) grows during summer and autumn in woods, fence corners, kitchen yards, and under wooden steps Its cap expands but little, is about 2 inches from edge to summit, and is borne in a thick (1¼-inch) stem, 6 to 8 inches tall, which rises from a white or pinkish cup 2 inches in diameter This toadstool cannot be mistaken when full grown, because of its exceedingly offensive odor, which attracts blowflies and carrion beetles The young plants are said to be very good when fried, but when mature the odor is against the species, and it is then considered unwholesome 11 Red-juice mushroom (*Hygrophorus conicus*), found in woods and open places from August to October, has a thin, fragile, acutely or obtusely conical yellow, bright-red, or scarlet cap ½ to 1 inch across, with a lobed margin, rather close, broad, yellow, free gills, and a hollow yellow stem, 3 to 6 inches long Formerly this species was considered poisonous, probably on account of its color, it is now proved not to be merely harmless, but good for food

Consult Farlow, "Some Edible and Poisonous Fungi," *Bulletin 15 Division Vegetable Physiology and Pathology, United States Department of Agriculture* (Washington, 1898), Marshall, *The Mushroom Book* (New York, 1900), Taylor, *Student's Handbook of Mushrooms in America* (Washington, 1897–98), Gibson, *Our Edible*

POISONOUS FUNGI



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1 FLY MUSHROOM – AMANITA MUSCARIA
2 SATAN'S MUSHROOM – BOLETUS SATANUS
3 EMETIC MUSHROOM – RUSSULA EMETICA
4 RUDDY-MILK MUSHROOM – LACTARIUS RUFUS
5 TRELLISED CLATHRUS – CLATHRUS CANCELLATUS
6 FIERY BOLETUS – BOLETUS PIPERATUS
7 DEADLY AGARIC – AMANITA PHALLOIDES
8 SPRING MUSHROOM – AGARICUS (AMANITA) VERNUS
9 VERDIGRIS MUSHROOM – AGARICUS ÆRUGINOSUS
10 FETID WOOD-WITCH – PHALLUS IMPUDICUS
11 RED-JUICE MUSHROOM – HYGROPHORUS CONICUS

Toadstools and Mushrooms (New York, 1895), Peck, *Mushrooms and their Use* (Cambridge, Mass, 1897), id, "Report State Botanist on Edible Fungi of New York," in *Annual Report New York State Museum*, vol iii, No 4 (Albany, 1900), Dumee, *Nouvel atlas de poche des champignons comestible et vénéneus* (Paris, 1905), Hard, *Mushrooms, Edible and Otherwise* (Columbus, Ohio, 1908), McIlvaine and Macadam, *One Thousand American Fungi* (rev ed, Indianapolis, 1912)

FUNGI, FISSION See SCHIZOMYCETES

FUNGIBLES, fŭn'jĭ-b'lz In the civil law, articles of personal property, such as food, fuel, etc, loaned to another for the purpose of being consumed, i e, such objects as cannot be used without being given away or consumed, which were the subjects of the civil-law contract of *mutuum* Objects of this nature, from the fact that they were got rid of one for another (*fungantur*), were called fungibles See MUTUUM

FUNGICIDE, fŭn'jĭ-sīd (from Lat. *fungus*, mushroom + *cædere*, to kill) Any material that will destroy fungi or prevent the germination of their spores Fortunately for agriculture and horticulture there are a number of substances which may be employed for this purpose On account of their destructive influence, copper salts, which form the basis of many fungicides, are used in several of the most important A few of the commonest and best fungicides are given herewith When used upon foliage, the liquids must all be applied as a mistlike spray, especially to the undersides of the leaves, where many of the fungi gain entrance through the stomata, and only in sufficient quantity to moisten the surfaces, without standing on them or running off in drops Neither should they trickle off dormant wood

Bordeaux mixture, accidentally discovered in France about 1882, is the best general fungicide known It consists of a solution of copper sulphate and lime The corrosive action of the former upon many kinds of foliage is neutralized by the lime, which also makes the mixture more adhesive The following is considered the best method of preparation In a wooden vessel dissolve copper sulphate at the rate of one pound to a gallon of water by suspending the salt in a coarse bag just below the surface of the water It will dissolve more quickly if suspended than if placed at the bottom In another vessel slake fresh lime with just enough water to cover it This lime should contain little or no magnesium. When slaked, add water until the proportion is one pound of lime to one gallon of water When needed for use, these two stock solutions, as they are called, are diluted with water and then mixed with as much agitation or stirring as possible The proportions in the final mixture should be five pounds of copper sulphate, five pounds of lime, 50 gallons of water, making what is known as the 5-5-50 mixture for applying to dormant wood and strong foliage, such as apples and currants, for young and for tender foliage, such as peach and plum, an extra pound of lime and 25 gallons more of water should be added It has been found that a still more dilute mixture can be successfully used without the injurious effects to foliage and fruit that follows the use of too strong mixtures. To test the neutrality of the mixture, a drop of ferrocyanide of potassium is added to a little of the compound, and if a brown color is observed, more lime must be added, if none, then the fungicide may be applied with safety The stock solution of copper sulphate may be kept indefinitely, the lime for only a few days Since the mixture deteriorates rapidly by the flocculation of lime particles, it should be mixed fresh for each application In order to make the fungicide more adhesive various substances may be added to it Among those most commonly used are iron sulphate, molasses, resin, casein, gelatin, etc

Ammoniacal copper-carbonate solution is almost as good as Bordeaux mixture, and since it is clear, and therefore produces no stain, it is better than Bordeaux mixture for spraying on ornamentals and ripening fruits It is made by dissolving one ounce of copper carbonate in one pint of ammonia and adding 10 gallons of water

Burgundy mixture, or soda Bordeaux mixture, is made by dissolving two pounds of copper sulphate in 50 gallons of water, three pounds of sodium carbonate (sal soda) in 50 gallons of water, and mixing the two solutions This mixture is without a sediment and may be used when spotting of fruit is to be avoided

Eau celeste is an important fungicide, but in inexperienced hands it may burn the foliage of many plants It is made by dissolving one pound of copper sulphate in two gallons of water, adding one and a half pints of ammonia when cooled and diluting with water to 25 gallons

Copper sulphate dissolved in water at the rate of one pound to 10 gallons of water is of great value as a spray for fungi, lichens, algæ, etc., upon dormant trees and vines It should not be used on foliage because of its corrosive action The seed of oats, wheat, barley, etc, may be soaked in this solution to destroy the spores of smut (q v)

Lime-sulphur solution, which was first used as an insecticide, especially for the control of San José scale, has been found to be a valuable fungicide, and is less corrosive to foliage than some of the other fungicides It may be secured in stock mixtures, or may be made by boiling fresh lime and sulphur together, or by slaking the fresh lime in contact with sulphur, the heat evolved being sufficient to dissolve the sulphur This is the so-called self-boiled lime sulphur With a few exceptions lime sulphur is as efficient as Bordeaux mixture and at the same time is a valuable insecticide

Sulphur has an important rank among fungicides, especially as a remedy for powdery mildews In outdoor use it is dusted upon the foliage, but in greenhouses it is generally evaporated Either the steam pipes are coated with it or it is more rapidly volatilized by heating it in a sand bath over an oil stove Extreme care must be exercised to prevent ignition, since the fumes of burning sulphur are fatal to plants, as may be seen from their use in ridding greenhouses of plant growths and spores upon the soil, benches, walks, etc Of course, when so used, the houses are emptied of useful plants

Hot water may be applied when nearly boiling to kill certain fungi and insects without injuring the plants Its more valuable use, however, is for the destruction of smuts of cereals For this purpose, also, solutions of formalin and of corrosive sublimate may be successfully employed The methods of using these fungicides will be described more fully in the article on SMUTS

Methods of Application The apparatus

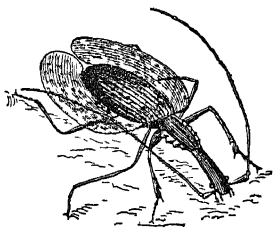
needed to obtain the mistlike spray referred to above are nozzles, hose, and a force pump The nozzles are the most important part of the machine Those of the Vermorel type are considered the most satisfactory for short range, and the McGowan or a nozzle devised at the Massachusetts Experiment Station for long Most progressive orchardists use the former upon the ends of long bamboo tubes, the operators often being raised upon platforms A common form of apparatus is the so-called "knapsack" pump, a tank which is strapped over the shoulders like a knapsack It contains a very compact and powerful pump, and is convenient for small plots and for crops that have grown too large to permit the entrance of a wagon sprayer A sprayer that uses compressed air for driving out the liquid is growing in favor for spraying on a small scale Success in combating plant diseases depends upon the thoroughness with which the fungicides are applied No fixed rules can be given as to times for spraying, but in general three or four applications should be given at intervals of 10 days or two weeks If much rainy weather intervenes, one or two additional sprayings may be profitably given In spraying fruit trees and vines of all kinds, the first application should be given just as the buds begin to swell, but before they show characteristic color No spraying should be given when the plants are in blossom, but one should follow the fall of the petals Plant diseases are worse during some seasons than during others, hot, moist weather favors the rapid growth of many fungi Perennial plants should be sprayed every season to keep them in good condition, the increased yields of better crops will more than pay for the trouble and expense of spraying Spraying is preventive, not remedial

Bibliography Lodeman, *The Spraying of Plants* (New York, 1896), Weed, *Spraying Crops* (ib, 1895), Prillieu, *Maladies des plantes agricoles* (Paris, 1895), Hollrung, *Chemische Mittel gegen Pflanzenkrankheiten* (Berlin, 1898), Massee, *Diseases of Cultivated Plants and Trees* (New York, 1910), Duggar, *Fungous Diseases of Plants* (ib, 1909), Stevens and Hall, *Diseases of Economic Plants* (ib, 1910); Truffaut, *Les ennemies des plantes cultivees* (Paris, 1912) Consult also numerous bulletins of the Agricultural Experiment Stations and of the United States Department of Agriculture, Washington, D C See also FUNGI; BACTERIA; BASIDIOMYCETES, ASCOMYCETES, ETC

FUN'GOID PARASITE. A name occasionally used for fungi which are parasitic upon plants or animals See FUNGI, ECONOMIC

FUN'GUS. A term in pathology, with several different meanings Almost any growth from the skin or mucous membranes which has a cauliflower-like or excrescent character may be referred to as a fungoid growth The term "fungus" is also used in connection with certain vegetable parasites which incite disease These are treated in the article FUNGI Bacteria and their relation to disease will be found fully described under BACTERIA and DISEASE, GERM THEORY OF, also found under their respective titles Yeasts occur in the stomach in some forms of indigestion and have been found in the bladder in diabetes A few cases of skin diseases have been reported in which the yeast fungus was apparently the exciting agent The most common molds which are met with in pathology are (1) the *Trychophyton tonsurans*, which is the active agent in the disease known as *tinea sycosis*, or ringworm (q v), (2) the *Achorion Schoenleinii*, which is the parasite of favus (q v), and (3) the *Microsporon furfur*, which is the cause of pityriasis versicolor, a skin disease

FUNGUS BEETLE, or FIDDLE An extraordinary carabid beetle (*Mormolyce phyllodes*) of Java and the neighboring mainland, very variable in size, but sometimes 3 inches long, yet so flat as to be able to creep into surprisingly thin crevices It is brown, with black legs and antennæ, and the elytra are thin, soft, translucent, and greatly expanded, giving it a very strange form These beetles remain in dark places, under bark, etc, during the day, and are particularly fond of hiding behind the fungi growing on trees Within these their eggs are laid and the larvæ make their home, feeding, it is believed, on the larvæ of other insects This insect is known to the English residents about Penang as the fiddle beetle, in allusion to the outline of its body



FUNGUS BEETLE

FUNGUS GNAT One of the little flies of the family Mycetophilidæ, so called from the fact that many of them breed in fungi, including edible mushrooms They are, as a rule, delicate and rather slender, with clear wings, but sometimes the wings are smoky or have large dark spots The larvæ are slender, cylindrical maggots, more or less wormlike in appearance The damage which they do in mushroom beds is sometimes very great, and it becomes necessary at certain seasons of the year to cover the growing mushrooms with gauze

FUNJ, fūnj, or **FUNG.** A mixed Hamite-Negro people on the upper Nile They have not the woolly hair nor the flat nose of the negro, and the color varies much as that of the mulattoes in the United States Their language also betrays their Abyssinian origin The Shilluks and Dinkas are of the same stock The Kingdom of Sennar was founded by them in the seventeenth century and lasted until overthrown by Mehemet Ali in 1821 Consult Bruce, *Travels* (Edinburgh, 1805)

FUNK, fuṅk, FRANZ XAVER VON (1840–1907) A Catholic theologian He was born at Abts-Gmund, Wurttemberg, and was educated at Tubingen, at the Seminary of Rottenburg, and in Paris, where he studied economics In 1870 he was appointed professor of theology at Tubingen and in 1876 became an editor of the Tubingen *Theologische Quartalschrift* His principal publications are: *Opera Patrum Apostolicorum* (1878, 2d ed, 1901), *Lehrbuch der Kirchengeschichte* (1886, 4th ed, 1902), *Die apostolischen Konstitutionen* (1891)—Funk thought the apostolic constitutions were written as late as the beginning of the fifth century, *Kirchengeschichtliche Abhandlungen und Untersuchungen* (1897–99)

FUNK, fūṅk, ISAAC KAUFFMAN (1839–1912) An American clergyman, editor, and publisher He was born at Clifton, Ohio, and was educated at Wittenberg College in his native State After

being pastor of St Matthew's English Lutheran Church, in Brooklyn, N Y, for seven years, he made an extensive tour through Europe, northern Africa, and Asia Minor (1872) In 1878 he entered into partnership with A W Wagnalls as book publishers They published many reprints of valuable English and continental books Among the religious publications founded by him after 1876 are the following. *Metropolitan Pulpit* (now the *Homiletic Review*) and the *Missionary Review* In 1889 the *Literary Digest* was established In 1895 the *Standard Dictionary* was published, and in 1913 the *New Standard Dictionary* A monumental undertaking was the *Jewish Encyclopædia* (12 vols, 1901–06) Dr Funk was a Prohibitionist and founded the *Voice* (1880), an organ of that party He interested himself in psychical research and published *The Next Step in Evolution* (1902), *The Widow's Mite and Other Psychic Phenomena* (1904), and *The Psychic Riddle* (1907)

FUNK, PETER A name used of persons employed at auctions to offer bogus bids in order to raise the price

FUNNY BONE. A term used to designate really not a bone, but the ulnar nerve, which is so slightly protected in the groove where it passes behind the internal condyle of the humerus (q v) that it is often affected by blows on that part (See ARM) A peculiar electric thrill passes along the arm to the fingers whenever the nerve is struck or pressed

FUN'STON, FREDERICK (1865–1917). An American soldier, born at New Carlisle, Clark Co, Ohio, the son of an artillery officer in the Civil War He studied for two years at the Kansas State University (Lawrence, Kans), was a member of the reportorial staff of the Kansas City *Journal*, became connected with the United States Department of Agriculture in 1891, accompanied the Death Valley expedition to southern California as assistant botanist, and in 1893–94 was in Alaska, where he made for the department a collection of the local flora and obtained material for the field report included in F V Coville's *Botany of Yakutat Bay* (Washington, 1895) In 1896 he was appointed deputy comptroller of the Atchison, Topeka, and Santa Fe Railway In the same year he offered his services to the Cuban Junta and later was commissioned captain of artillery and distinguished himself as such at La Machuca He was promoted successively to be major and lieutenant colonel (for bravery at Las Tunas), endeavored, because of wounds and illness, to escape to the United States, was captured by the Spanish and condemned to death, but was finally set free At the outbreak of the Spanish-American War he became colonel of the Twentieth Kansas Volunteers From November, 1898, he served in the Philippine Islands, where, for bravery at Calumpit, he was appointed brigadier general of volunteers in 1899, and on March 23, 1901, captured Emilio Aguinaldo, the insurgent leader On March 30 he was commissioned brigadier general, U S A In 1905 he was placed in command of the Department of California, with headquarters at San Francisco, where he aided in the preservation of order and rendered valuable services to the civil authorities after the San Francisco earthquake of 1906, and in December, 1907–March, 1908, commanded troops at Goldfield during the strike riots After the occupation of Vera Cruz (q v) by American sailors and marines, Funston was sent to take over the administration of the city (May, 1914) The following November he was promoted major general Consult General Funston's *Memories of Two Wars* (New York, 1911)

FUR AND THE FUR TRADE (OF *forre, fuerre* It *fodero*, case, sheath, from Goth *fōdr*, AS *fōdder*, OHG *fuotar*, Ger *Futter*, sheath) Many species of animals, especially those living in cold climates, have a soft, silky covering called fur, which in some animals is mixed with a covering entirely different in texture, long and straight, called the overhair It is often this overhair which gives the distinctive peculiarity and beauty to the fur The use of the skins of beasts with the fur still on them, as clothing, is of very ancient origin The Chinese and Japanese used furs as articles of luxury at least 2500 years ago Herodotus mentions their use by other ancient peoples By the Romans furs were much prized, especially during the later days of the Empire The Saracens also made great use of them, and from them the Crusaders brought furs into general favor in Europe, where so much extravagance was exhibited in their use that in both France and England sumptuary edicts were issued against this fashion But such laws, like most regulations of the sort, had little effect, and the demand for furs continued among all classes of people It was to meet this demand that those pioneer explorers, the trappers and traders, penetrated the northern forests of America and established little trading stations which proved the vanguards of civilization Albany and St Louis, and many other flourishing American cities, are the outgrowth of these stations In the early days the most valuable furs could be obtained from the Indians in exchange for glass beads or other trifles At one time this trade was carried on, especially in Canada, by *coureurs des bois*, but the scandalous practices of these reckless rangers brought the trade into such disrepute that a licensing system was established

Beaver skins were used in New Amsterdam and elsewhere in place of gold and silver for currency, and the figure of a beaver is a conspicuous device on the escutcheon of the city of New York The search for furs was one of the objects of the daring expeditions of the voyagers of French Canada, as the search for gold was the motive of the Spanish invasion of Mexico and South America The famous Hudson's Bay Company originated in 1670 and claimed the entire country from the bay to the Pacific, and from the Great Lakes to the Arctic Ocean, except such portions as were then occupied by Frenchmen and Russians Towards the close of the eighteenth century certain Canadian merchants formed the Northwest Fur Company, having their headquarters at Montreal, their operations being carried on in the districts watered by rivers that flow to the Pacific This organization soon became a formidable competitor to the Hudson's Bay Company In 1821 the two companies united In 1763 some merchants of New Orleans established a fur-trading post where St Louis now stands, under the management of the brothers Chouteau. For the first half of the nineteenth century the St Louis trade was from $200,000 to $300,000 a year One of the most famous of early American fur traders was John Jacob Astor, of New York, who began by trading in a small way after his arrival in the country in 1784. By 1810–12 his

trade, conducted under the name of the American Fur Company, was enormous An entirely new field for American enterprise was opened by the purchase of Alaska in 1867, which secured complete control of an important seal fishery In 1914 the furs shipped from Alaska amounted in value to $701,511, this figure including other furs than seal The sealskin industry had early become an important one and national and international action was necessary to prevent extinction of the herds See under SEAL; SEALING.

Seekers for furs must now go beyond the extreme limits of civilization, especially in America, and the Arctic regions are hunted over to secure the pelts In more civilized regions the hunter-trapper age is passing, and to meet the increased demand for valuable furs domestication and breeding must be developed Already fur farming is being undertaken on a large scale in Canada, while the Karakule sheep, from which are obtained Persian lamb and broad tails, have been domesticated in Russia, and attempts have been made in Germany and America to produce by cross-breeding a sheep that will yield similar fur Skunk farms are also in successful operation, and scientific biologists are being consulted in order to provide for new and valuable furs Each animal presents special problems in regard to both domestication and breeding

Collectors and dealers in Canada and the United States usually forward their furs to the seaboard, chiefly to New York, for sale there, or for consignment principally to London and Leipzig In 1913 the United States government decided to send its sealskins and fox pelts from Alaska to be cured and sold at public auction at St Louis, and it was thought that this might be the means of developing that city as one of the important fur centres of the world. Previously London had been recognized, even in America, as the great fur-dressing centre and market, and still remains the chief, and the great auctions are held there. To London are sent not only much of the produce of Asia and Europe, but also the fine peltries of Chile and Peru, the nutria from Buenos Aires, the fur seal of Cape Horn and South Shetland, the hair seal from Newfoundland, as well as the inferior peltries of Africa

To prepare fur skins in a way to endure this long transportation is a simple and easy matter When stripped from the animal, the flesh and fat are carefully removed, and the pelts hung in a cool place to dry and harden, nothing is added to protect them Care is taken that they do not heat after packing and that they are occasionally beaten to destroy worms A marked exception is the case of the fur seal, which is best preserved by liberal salting and packing in hogsheads All other raw furs are marketed in bales

Few kinds of animals furnish a pelt of suitable weight and pliability, and all of them differ widely in elegance of texture, delicacy of shade, and fineness of overhair, and these differences determine their place in the catalogue of merchandise These few animals are not very prolific, and many of them attain their greatest beauty in wild and uncultivated regions, although there are some notable exceptions Being thus few in kind and limited in quantity, the extinction of the several choice varieties has been threatened through the persistent energy of trappers

The principal North American fur-bearing animals are beaver, muskrat, hare, and squirrel, the mink, sable, fisher, ermine, weasel, raccoon, badger, and skunk, the lynx, northern and southern, bears of several kinds, foxes of three or four varieties, two wolves, and, most valuable of all, musk ox, seal, and sea otter Of foreign fur-bearing animals the most highly prized are the chinchilla, coypu (nutria), and various monkeys, marsupials (opossum, kangaroo, etc), and cats (See articles under their names, also, FUR-BEARING ANIMALS) Many of the animals, however, enumerated in the American list are also natives of northern Europe, whence their pelts come to market under other names In fact, there is a wide diversity of name between the trade designations of the various furs and the actual animals

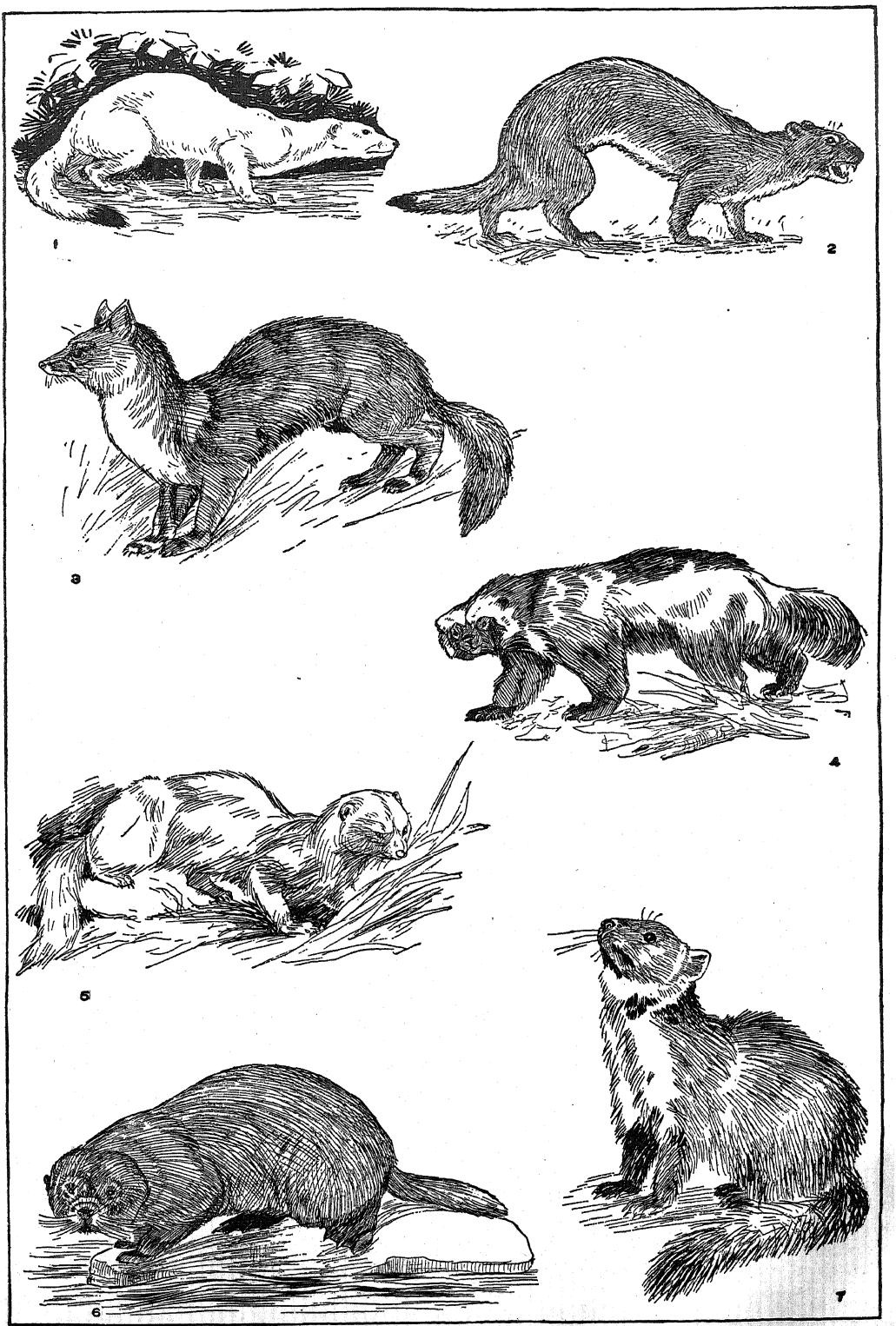
For manufacturing purposes furs are classified into *felted* and *dressed* Felted furs, such as beaver, nutria, hare, and rabbit, are used for hats and other felted fabrics, in which the hairs or filaments are made so to interlace or entangle as to form a very strong and close plexus The quality of the fur is better when the skin is taken from the animal in winter than in any other season, giving rise to the distinction between "seasoned" and "unseasoned" skins The removal of the fur from the pelt is a necessary preliminary to the preparation of fur for felting purposes The long hairs are cut off by a kind of shears, and the true fur is then removed by the action of a knife, requiring much care in its management In some sorts of skin the long hairs are removed by pulling instead of shearing, in others the greasiness of the pelt renders necessary a cleansing process, with the aid of soap and boiling water, before the shearing can be conducted; and in others both pelt and fur are so full of grease as to require many repetitions of cleansing

Furs have their felting property sometimes increased by the process of *carroting*, in which the action of heat is combined with that of sulphuric acid The chief employment of felted furs is described under HAT, *Manufacture* See also FELT

Dressed furs are those to which the art of the *furrier* is applied for making muffs, boas, and fur trimmings for garments The fur is not separated from the pelt for these purposes, the two are used together, and the pelt is converted into a kind of leather to fit it for being so employed

The process of dressing furs, while in its general outlines the same, differs in its details with the character of the fur The fur of the seal is prepared as follows The salt used in packing is first thoroughly washed out, and every particle of flesh is carefully removed from the inside of the hide, after which the skins are stretched on frames and slowly dried The process of thorough washing, this time in soapsuds, is repeated, and while the skin is still moist the long overhair is removed with a knife, leaving only the short soft fur This process is a delicate and tedious one The skin side of the pelts, after being subjected to moist heat, is shaved down until a smooth, even surface is obtained When the skin is again dry, it is placed in a tub filled with fine hardwood sawdust, which absorbs any moisture remaining, and is softened and rendered flexible by treading with the bare feet It is now ready to be dyed The coloring matter is applied with a brush to the tips of

FUR-BEARING ANIMALS



1. EUROPEAN WEASEL (Mustela erminea), in white winter or Ermine dress.
2. WEASEL (Mustela erminea), in brown summer or Stoat dress.
3. SABLE (Mustela zibellina).
4. WOLVERINE OR GLUTTON (Gulo luscus).
5. EUROPEAN FERRET OR POLECAT (Mustela putorius).
6. SEA OTTER (Latax lutris).
7. AMERICAN PINE MARTEN (Mustela americana).

the fur and distributed by shaking the fur It is then dried and brushed The process of dyeing, drying, and brushing is often repeated as many as 12 times

Statistics. The Thirteenth United States census in its report on manufactures, published in 1913, deals separately with fur goods and furs dressed Under the former classification the manufacturers making various articles of apparel such as fur sets, overgarments, fur hats, caps, and gloves, were considered These firms usually purchased their material in a dressed condition, but occasionally certain establishments dressed the furs themselves, so that the two divisions in the trade may overlap The largest part of the manufacturing is done in New York City, it being the centre both of the industry and of the fashions The production in 1909 amounted to about $40,000,000 of furs, or 71 per cent of the total for the United States, and in 1912, of $17,000,000 worth of fur skins imported into the United States, the metropolis used $15,000,000 In 1909 there were 1241 establishments in the United States engaged in the manufacture of fur goods, with an average number of 11,927 wage earners, who received in wages $7,787,845 and produced a product valued at $55,937,549. This may be contrasted with the similar figure for 1889, when there were 484 establishments employing 6547 wage earners, who received in wages $3,477,148 and produced a product valued at $20,526,988 In addition, in 1909, products valued at $532,781 were reported by establishments engaged primarily in the manufacture of gloves and men's clothing Under the classification of "dressed" furs where the pelts are scraped, curried, tanned, and bleached, hatters' fur, dressed hair, and brush manufacturers' supplies are also included It was reported that in 1909 there were 93 establishments engaged in this industry, with a total average number of 1241 wage earners and a product valued at $2,390 959, which could be compared with the annual product of 1904, which was $2,215,701, and 1899, when it was $1,400,455

The foreign trade in furs fluctuates greatly The imports of furs and fur skins into the United States was in 1912 $17,399,000 and in 1914 but $8,840,000, and of furs dressed on the skins in 1912 $5,346,000 and in 1914 $3,204,000 The exports in 1913 were $18,390,000 and in 1914 $14,969,000 The value of raw seal skins exported in 1914 was but $37,199 The imports are chiefly from Germany, England, and Canada, the exports chiefly to England and Germany. Consult Petersen, *The Fur Traders and Fur-Bearing Animals* (Buffalo, 1913), and Werner, *Die Kurschner Kunst* (Leipzig, 1914)

FURANI See FURS

FUR-BEARING ANIMALS. The group of animals whose pelts are utilized as fur garments or ornaments, forming the carnivorous family Mustelidæ This family, which includes, besides its typical weasels (Mustelinæ), the skunks (Mephitinæ), the badgers (Melinæ), the otters (Lutrinæ), and the sea otters (Enhydrinæ), the honey badgers, ratels, etc, is world-wide in its spread outside of Australia. It is in the Northern Hemisphere, however, that the family is now most numerous and well represented, and it is in response to the demand of the cold winters of the subarctic regions, to which the most valuable of these animals are confined, that their coats have become the warm pelts which mankind finds so serviceable and attractive. All are small animals, the largest (the wolverine) being only about 3 feet long Their bodies are in most cases slender, their legs rather short, their heads round, with very powerful jaws and teeth, and their tails (except in the skunks) are rather short Great strength, nimbleness, and courage characterize them, and many exhibit a blood thirst beyond that of any other carnivore, nevertheless, they have been tamed Weasels have always acted as mousers in the East and were so used in ancient Græco-Roman civilization Ferrets still serve as vermin catchers, and otters have been taught to fish, while badgers were formerly used in cruel sport Most of them are terrestrial and live in burrows of their own digging, but some are arboreal They feed upon small mammals, birds, birds' eggs, fish, crustaceans, and insects, and all possess in a greater or less degree anal glands, from which they can discharge at will (sometimes shooting it a long distance) an acrid fluid, which is intensely offensive to the nostrils and mucous membrane of other animals The chase of the leading members of this family has long been and still is an important industry on the frontiers of Europe and North America, and thousands of pelts have been gathered annually without exterminating any of the race, though the habitats of many species have been much reduced Statistics of the trade in furs in London show that during the last century the receipts of pelts there of Mustelidæ alone, from North America exclusively, amounted to about 3,250,000 sables, 1,500,000 otters, 100,000 wolverines, 3,000,000 minks, 25,000 sea otters, 500,000 skunks, and 500,000 badgers, besides an unknown number of ermines, fishers, etc "The scientific interest with which the zoologist, as simply such, may regard this family of animals, yields to those practical considerations of everyday life which render the history of the Mustelidæ so important" Consult authorities mentioned under MAMMALIA, especially Coues, *Fur-Bearing Animals* (Washington, 1877) See BADGER, ERMINE, FERRET, FISHER, FUR FARMING, MARTEN, OTTER, POLECAT, SABLE, SEA OTTER, SKUNK, WEASEL, WOLVERINE, and similar titles

FÜRBRINGER, fur'brĭng-ēr, MAX KARL (1846–1920) A German anatomist and writer on comparative morphology, born at Wittenberg and educated at Jena and Berlin In 1888 he became professor at Jena and in 1901 at Heidelberg His publications include valuable works on the anatomical structure and development of the Vertebrata, such as *Die Knochen und Muskeln der Extremitaten bei den schlangenahnlichen Saurien* (1870), *Zur vergleichenden Anatomie der Schultermuskeln und des Brustschulterapparates* (5 parts, 1872–1902), *Zur Entwicklung der Amphibienniere* (1877), *Untersuchungen zur Morphologie und Systematik der Vogel* (1888), *Morphologische Streitfragen* (1902), *Abstammung der Saugetiere* (1904)

FUR'CA ET FLAGEL'LUM (Lat gallows and whip) In feudal relations, the lowest of servile tenures, in which the bondman was entirely at the lord's mercy, both in life and limb

FURETIÈRE, fur'tyâr', ANTOINE (1619–88) A noted French philologist, lexicographer, and novelistic satirist He was born in Paris, was trained for the law and the Church, but afterward gave his life to letters. He published a volume of verse (1655) and two satires, the *Nouvelle allégorique, ou Histoire des derniers*

troubles arrivés au royaume d'éloquence (1658) and *Voyage de Mercure* (1659). These won him an academic seat (1662). Already he had begun the preparation of a dictionary which, as its copyright "privilege" states, was to contain all French words, old as well as modern. For 12 years he labored on it, when in 1674 a royal decree was issued forbidding any one to publish a dictionary till that of the Academy should appear. After a remarkable contest against his 39 fellow Immortals, Furetière was unjustly expelled from the Academy (1685), and his right to print in France revoked. He died two years before his dictionary appeared at Rotterdam (1690), under the title *Dictionnaire universel contenant généralement tous les mots français tant vieux que modernes et les termes des sciences et des arts*. Among his novels is *Le roman bourgeois* (1666), a realistic novel, portraying several interesting types of the middle class, as a reaction against the squeamish and sentimental characters of the aristocratic literature of the day. Furetière's dictionary was edited by Basnage in 1701 and again revised in 1725. It furnished the basis for the *Dictionnaire de Trévoux* that at length displaced it. Consult Gosse, "The Romance of a Dictionary," in the *Independent* (New York, 1901), and H. Chatelain, "Quelques remarques sur Furetière et ses prédécesseurs dans le roman réaliste du XVIIIe siècle," in *Revue Universitaire* (Paris, 1902).

FUR FARMING. The commercial rearing of fur-bearing animals for their pelts. This industry was begun on account of the declining yield from the sources of supply in regions exploited by the historic fur-trading companies. The efforts of the hunter and the trapper no longer meet the increasing demand for furs, especially of the more costly varieties. Fur farming includes the rearing of fox, beaver, mink, muskrat, fisher, raccoon, sable, skunk, reindeer, and the sheep that produce the fur called Persian lamb. The rearing of foxes, reindeer, and of muskrat (in the New England States) has proved successful, while that of other fur-bearing animals is yet in the experimental stage and in some cases has government aid. For some years blue Arctic, and more recently silver black, foxes have been reared on islands off the Alaskan coast leased for that purpose. (See FOX, ALASKA.) In Prince Edward Island, Canada, fox farming attained phenomenal growth after 1900 and is regarded as firmly established notwithstanding the speculative features of the industry. According to the report for 1913 of the Commissioner of Agriculture for that island, there were in that year 277 ranches, with over 2500 foxes, young and old, of which more than half were silver black. The value of these ranches was estimated at $15,000,000—more than twice the value of all the ordinary farm live stock in the island, according to the census of 1911. Although the pelts have sold well in the London market, yet during 1909–14 the sales were chiefly for breeding purposes, proved breeders of quality fetching from $12,000 to $15,000 a pair, and in rare cases up to $40,000 a pair. The influence of the London and other fur markets promotes the stability of the industry by restricting the production of skins which can be imitated by dyeing. Sales of skins of the pure black variety fell off largely on this account during 1913, while skins of the silver black variety maintained their position because they cannot be successfully imitated, the best silver black pelts fetching from $1800 to $2500 each. Such skins command these high prices on account of their sheen, the beauty and length of their overhairs, and the fineness of their underwool. These rare qualities distinguish the greater number of the Prince Edward Island foxes. The progeny of the silver black foxes caught there yield the best fur. Pure black foxes were also imported from Newfoundland, Labrador, and Ontario. The industry has spread to the other Canadian provinces, and in 1913 there were over 50 fox ranches in Nova Scotia, and in 1912 there were 8 in New Brunswick, 6 in Ontario, and 14 in other provinces. Part of the Nova Scotia foxes are the progeny of the blue Arctic variety, bred in the Alaskan Islands. In 1912 a number of these were imported into the Maritime Provinces and sold for about $800 a pair. There are about 50 mink ranches in Canada, principally in the Province of Quebec, and there is an extensive ranch in Nova Scotia for the production of Persian lamb wool. The reindeer industry, which is cultivated not only for the fur, but for the milk and meat of that animal and also for transportation purposes, prospers in Lapland and Labrador. Two hundred and fifty head were sent to Labrador in 1907, and in 1911 they had increased to 1200 head. In 1914 the industry was further extended to Alberta, and preparations were made to establish it in the Yukon Territory. The Ontario government publishes an offer to supply to fur farmers in that province mink, marten, fisher, and beaver from Algonquin Park. Consult *Reports of the National Conservation Commission* (Washington), *Reports of the Commissioner of Conservation* (Ottawa), *Reports of the Commissioner of Agriculture* (Prince Edward Island, Canada).

FURFOOZ (fŭr'fōz') **RACE.** From brachycephalic skulls found at the Trou de Frontal, Furfooz, Belgium, this type of mankind is supposed to date from the end of the Quaternary period, just at the commencement of the Neolithic period (q.v.). Consult Mortillet, *Le Préhistorique* (Paris, 1900), and Sergi, *The Mediterranean Race* (London, 1901).

FURIANT, fōō'rĭ-ant. A very lively Bohemian dance, characterized by strongly marked accents and varying time. In the works of Dvořák it frequently takes the place of the usual scherzo (q.v.).

FU'RIES. See EUMENIDES.

FURIOSO, fōō'rē ō'sō, BOMBASTES. See BOMBASTES FURIOSO.

FURIOSO, ORLANDO. See ORLANDO FURIOSO.

FU'RIUS, MARCUS FURIUS BIBACULUS (c. 103 B.C.–?). A Latin poet, born at Cremona. He wrote iambics, epigrams, and a poem on Cæsar's Gallic wars. "Jupiter hibernas cana nive conspuit Alpes," a line in the poem on Cæsar, is parodied by Horace (*Sat.*, ii, 5, 41), who substitutes Furius for Jupiter, and *conspuet* for *conspuit*, and speaks of the poet as *pingui tentus omaso*, distended with fat tripe. It is probable that Furius also wrote the poem *Æthiopis*, containing an account of the killing of Memnon by Achilles (q.v.), and that the *turgidus Alpinus* of Horace (*Sat.*, i, 10, 36) is really Bibaculus. He is compared by Diomedes with Horace and Catullus and is enumerated among the Roman iambic poets by Quintilian (x, 1, 96). Consult: Bährens, *Fragmenta Poetarum Romanorum* (Leipzig, 1886); Weichert, *Dissertatio de Turgido Alpino S. M. F. Bibaculo* (Meissen, 1882);

Schanz, *Geschichte der römischen Litteratur*, vol 1 (3d ed, Munich 1907)

FUR'LO PASS See FOSSOMBRONE

FURLOUGH, fûr'lō (Dutch *verlof*, from Dan *forlov*, leave, from *for*, Eng *for* + *-lof*, Dan *lov*, Ger *Laube*, Eng *leave*, permission) A military term, applied to the leave of absence granted enlisted men It does not apply to commissioned officers of the United States army, but does apply to English officers on foreign service In the United States army furloughs in the prescribed form for periods of three months may be granted to enlisted men by commanding officers of posts, and for periods of one month by commanding officers of general hospitals, general depots of supply, mine planters, or by regimental commanders if the companies to which the men belong are under their control Brigade and district commanders may grant furloughs for periods of three months to enlisted men under their immediate control The number of men furloughed at any one time is not to exceed 5 per cent of the enlisted strength

In England the furlough season is confined to the winter months, generally from the 15th of October to the 15th of March All soldiers with over 12 months' service and qualified in conduct and musketry ability are entitled to six weeks' furlough In France and continental Europe generally, soldiers in the active army who have qualified in their duties and can read and write may at the end of a prescribed period be sent on furlough for an indefinite period

The army reserve was established in the United States army by Act of Congress dated Aug 24, 1912 Under this act a recruit enlists for a period of seven years in active service and in the army reserve At the end of three years with the colors he is furloughed to the reserve for four years, without pay, but is subject to be recalled to the colors in case of war, in which case he receives a money bonus.

FURMAN, fōōr'man, RICHARD (1755–1825) An American Baptist clergyman, born at Esopus, N Y He was pastor of the First Baptist Church of Charleston, S C, from 1787 until 1822 During this period he was also active as a legislator and took part in the deliberations on the first constitution of South Carolina. As one of the foremost promoters of the Baptist movement, he was elected in 1814 first president of the Triennial Convention of Baptists Furman University (Baptist) at Greenville, S C, was named in his honor, and his son, James Clement Furman (1809–91), was its president Consult the memoir in Sommers's *Memoir of John Stanford* (New York, 1835)

FUR'NACE (from OF *fornais*, Fr *fournaise*, It *fornace*, from Lat *fornax*, furnace, from *fornus*, oven, connected with Lat *formus*, Gk θερμός, *thermos*, Skt *gharma*, hot, Eng *warm*) A structure in which to make and maintain a fire, the heat of which is used for heating, generating steam, smelting ores, melting metals and glass, baking pottery, and for a great variety of other purposes in science and the arts Furnaces may be divided into the following classes 1 Furnaces in which the fire and the material to be heated are placed in contact To this class belong the open blacksmith fire (see FORGE), blast furnace, cupola or foundry furnace, etc (See FOUNDING and IRON AND STEEL for descriptions of blast furnaces and converters and foundry furnaces) 2 Furnaces in which the fuel is in one compartment and the material to be heated in another, the material being heated by the flame and hot gases from the burning fuel The most familiar form of this class of furnace is the reverberatory, employed in heating and melting iron and steel (See IRON AND STEEL) 3 Furnaces in which the material to be heated is within a closed chamber or retort which is heated externally by the fire or by flame and gases from the fire Pot furnaces for making glass (see GLASS) and crucible furnaces for making crucible steel (see IRON AND STEEL) are examples Furnaces may employ gas, powdered coal, and oil as fuel The Siemens gas furnace is used in steel manufacture (See IRON AND STEEL) Furnaces for generating steam and those for heating form in a measure classes in themselves See BOILER, FUEL, HEATING AND VENTILATION, KILN

FURNEAUX, fûr-nō', TOBIAS (1735–81) An English navigator and discoverer, born at Swilly, near Plymouth He entered the navy and served in the Seven Years' War In 1766 he accompanied Wallis in the latter's voyage around the world Three years after his return in 1768, he commanded the *Adventure* in Captain Cook's voyage, but twice became separated from him, and continued his exploration independently along the coast of Tasmania, naming the principal points on it Cook named a group of the Low Archipelago in his honor

FURNEAUX ISLANDS An Australasian group in lat 40° S and long 148° E, lying in Bass Strait between Australia and Tasmania They were discovered in 1773 by Tobias Furneaux Flinders Island is the largest

FUR'NESS, CHRISTOPHER FURNESS, BARON OF GRANTLEY (1852–1912) An English shipbuilder The son of a provision merchant, he entered that business in 1870 and made such an immediate success that he was able to establish the Furness line of steamships (1877), the shipbuilding concern of Furness, Withy & Co (1891), and the South Durham Steel and Iron Company (1898) In 1908 he set up a system of profit sharing with his workmen, who voted in 1910 to have it discontinued He was knighted in 1895 and made a peer in 1910 He was a Liberal member of Parliament in 1891–95 and 1900–10 and was reelected in 1910, only to be unseated on petition.

FUR'NESS, HORACE HOWARD (1833–1912). An American Shakespeare scholar, born in Philadelphia The son of William Henry Furness, a Unitarian clergyman and author, he graduated at Harvard in 1854 After a period in Europe, during which he received from Halle the degree of Ph D, he returned home, studied law, and was admitted to the bar in 1859 He contributed to Troubat and Haly's *Practice on Ejectment*, etc, and was a member of the Seybert commission to investigate modern spiritualism, but his *Variorum Shakespeare* is his especial work. *Romeo and Juliet* (1871) was the first volume to appear Then followed *Macbeth* (1873); *Hamlet* (2 vols, 1877), *Lear* (1880), *Othello* (1886), *Merchant of Venice* (1888); *As You Like It* (1890), *Tempest* (1892), *Midsummer Night's Dream* (1895), *Winter's Tale* (1898). *Much Ado About Nothing* (1899), *Twelfth Night* (1901), *Love's Labor Lost* (1904), *Anthony and Cleopatra* (1907), and *Cymbeline* (1913) Associated with him in his work was his wife, herself author of a *Concordance* to Shakespeare's poems, and his son, Horace Howard Furness, Jr Everywhere the *Variorum*

edition has been received as a monument of scholarship, and the adoption, since 1886, of the text of the First Folio as the basis of the work will by many be thought a distinct gain Dr Furness's services to learning were recognized by Columbia, Harvard, and Yale in the bestowment of honorary degrees, and he was made a member of the American Academy of Arts and Letters In the year of Dr Furness's death appeared (privately printed) *Appreciations of Horace Howard Furness* (Cleveland), which contained papers by Talcott Williams and Agnes Repplier

FURNESS, HORACE HOWARD, JR (1865–). An American Shakespearean scholar, son of Horace Howard Furness, and brother of William Henry Furness, 3d He was born in Philadelphia and graduated from Harvard University in 1888 From 1891 to 1901 he was an instructor in physics at the Episcopal Academy of his native city, and after that period he became a coworker with his father, and his father's successor, on the *Variorum Shakespeare* He edited *Macbeth* (1903), *Richard III* (1908), *Julius Cæsar* (1913)

FUR'NESS, WILLIAM HENRY (1802–96). A Unitarian clergyman He was born in Boston, graduated from Harvard in 1820, studied theology at Cambridge, and was minister of the First Unitarian Church of Philadelphia from 1825 to 1875 He was prominent in the anti-slavery movement Harvard gave him the degree of D D in 1847 His writings include translations from German verse and prose and *Remarks on the Four Gospels* (1838), *History of Jesus* (1850), *The Unconscious Truth of the Four Gospels* (1868), *The Power of Spirit Manifested in Jesus of Nazareth* (1877), *The Story of the Resurrection Told Once More* (1885) Consult the sketch in *Proceedings of American Philosophical Society, Memorial Volume I* (Philadelphia, 1900)

FURNESS, WILLIAM HENRY, 3D (1866–). An American ethnologist, born at Wallingford, Delaware Co, Pa, a son of Horace Howard Furness He was educated at St Paul's School, Concord, N H, at Harvard, where he graduated in 1888, and at the medical school of the University of Pennsylvania (1891). For scientific purposes he traveled much in South America and wrote interestingly of his researches there and elsewhere, in such books as *Folklore in Borneo* (1899), *Life in the Luchu Islands* (1899), *Home Life of the Borneo Head-Hunters, its Festivals, and Folk-Lore* (1902), and *Uap, the Island of Stone Money* (1910) In recognition of this and similar work he was made a fellow of the Royal Geographical Society and a member of other scientific associations He was elected secretary and curator of the Free Museum of Science and Arts, University of Pennsylvania, in 1904

FURNI ISLANDS, foōr'nē (Lat *Corassiæ* or *Corseæ*) A group of small islands in the Grecian Archipelago, in about lat 37° 35′ N and long. 26° 30′ E, between Nikaria and Samos, the largest of them is Furni It is about 7½ miles long and has an average width of about 1 mile It is the only inhabited island of the group The islanders are settled in a small bay on the west coast They have very little intercourse with the rest of the world

FUR'NISS, HARRY (1854–1925) An English caricaturist, author, and lecturer He was born at Wexford, Ireland, and was entirely self-taught in art At the age of 19 he went to London, contributed for many years to the *Illustrated London News* and other magazines, and in 1880 joined the staff of *Punch* His *Diary of Toby, M P*, illustrating the parliamentary section, became especially popular His *Royal Academy Guy'd* was another favorite contribution to *Punch*, and in 1890 he published a volume of stinging caricatures of leading artists entitled *Royal Academy Antics* He withdrew from *Punch* in 1894 and started the *New Budget* and two other short-lived publications He illustrated, among other works, Payn's *Talk of the Town*, Carroll's *Sylvie and Bruno*, Gilbert A'Beckett's *Comic Blackstone*, *Happy Thoughts*, Dickens's complete works (1910), and Thackeray's complete works (1911) His original publications include *America in a Hurry* (1900), *Confessions of a Caricaturist* (1901), *Harry Furniss at Home* (1904), *Poverty Bay* (1905), *How to Draw in Pen and Ink* (1905), *Harry Furniss's Christmas Annual* (first issue, 1905) He lectured in the United States, Canada, and Australia, and wrote, produced, and acted many photoplays Furniss is a brilliant draftsman, possessing great vigor, versatility, and facility of execution Consult Spielmann, *Magazine of Art*, vol xxiii (London, 1899)

FUR'NITURE (Fr *meubles*, Ger *Mobel*, It *mobiglio*) Decorative frames and boxes, such as chairs, beds, tables, and chests, to sit on or lie on, place things on or in, called movables (see above) by the French, Germans, and Italians, and usually made of wood ornamented with carving, paint, gilding, lacquer, inlay, veneer, or compo, often upholstered in leather, haircloth, cane, tapestry, brocade, damask, and other textiles From stools and chairs were developed benches, settees, sofas, davenports, from chests and tables were developed cabinets, desks, bureaus, chiffoniers, sideboards, and other case goods (as they are called by the trade) Movable objects commonly classed with furniture are mirrors and pictures, clocks, pianos, lamps, and stoves In a still broader sense furniture includes carpets and rugs, draperies, wall hangings, bedding and tableware, as well as lighting fixtures and interior woodwork

Very definitely is furniture a measure of civilization Primitive peoples sit and lie on the ground, sometimes carpeted with leaves, rushes, hides, blankets, or rugs Nomadic tribes do not trouble to construct chairs and beds and tables that it would be difficult or impossible to transport from camp to camp Only when men and women settle down in houses with floors do they acquire the habit of supporting their bodies on raised seats and couches Chairs are fundamental They mean that those using them live, not on the floor, but from 15 to 20 inches above it They lead to the ultimate development of other raised furniture to match For analysis and description of the historical styles as applied to furniture, see INTERIOR DECORATION

Japanese As long as the Japanese sat on the floor, their homes were bare of furniture Bedsteads and raised couches they had none Shelved closets took the place of bureaus, chiffoniers, commodes, and wardrobes Their writing tables were only 5 or 6 inches high and 1 foot or 2 wide, convenient only for those seated on the floor For the storage of gems and other small objects, they had small lacquered cabinets with numerous drawers and shelves.

Chinese The Chinese have for centuries used chairs and other raised furniture Sir William Chambers, the English architect, who traveled extensively in China, wrote in 1757 "The movables of the Chinese saloon consist of chairs, stools, and tables, made sometimes of rosewood, ebony, or lacquered work, and sometimes of bamboo only, which is cheap, and nevertheless very neat When the movables are of wood, the seats are often of marble or porcelain The bedroom contains no other furniture than the bed, and some varnished chests in which they keep their apparel The beds are sometimes very magnificent, the bedsteads made much like ours in Europe, of rosewood carved, or lacquered work The movables of the study consist of elbowchairs, couches, and tables, there are several shelves filled with books, and on a table near the window are placed, in good order, pencils and other implements for writing" In the furniture illustrated by Sir William, straight lines and fretwork effects predominate, and the general appearance is like that of the rosewood and teakwood and bamboo tables and stands, stools and chairs and settees imported from China to-day

Egyptian While it is possible to study ancient furniture from the illustrations that survive in the form of mural low reliefs and paintings, one actual example is worth 100 pictures Fortunately the dry climate of Egypt has preserved for us in graves and tombs a few such examples, which, supplemented and interpreted by the ancient illustrations showing chairs and thrones, stools and couches, actually in use, are gradually beginning to give us an exact knowledge of the size, structure, and proportions One such example is a child's chair in the New York Metropolitan Museum, pictured in the *Bulletin* of that museum for April, 1913, on page 75 Now, a chair of similar size and proportions was used by Demi-uza, daughter of the Egyptian officer Nen-waf, who sat with both feet on the chair, her left leg doubled up under her, her right leg drawn up before her, as is illustrated in the limestone grave stela of the family in the Metropolitan Museum The chair belonging to the museum is of wood, came from Thebes, and dates from about 1500 B C It is 23 inches high, with seat 17 inches wide, 18½ inches deep, and 7½ inches high The back is filled with vertical wooden panels about ¼ of an inch apart Long angle braces cut out of forked branches, thus utilizing the full natural strength of the wood, reenforce the union of legs with seat Angle braces also hold the back firmly to the seat and introduce pleasing curves into the outline The frame is held together entirely with wooden dowels and pegs The seat was originally upholstered in plaited linen strings, fragments of which still remain in some of the 60 holes that are equally divided among the four rails This interwoven filling was the nearest approach to springs with which the ancient world was acquainted Much superior in construction and finer in finish are three armchairs in the Museum of Cairo, Nos 51,111, 51,112, 51,113, all illustrated and described in vol xliii of the *General Catalogue* of the museum (Cairo, 1908) No 51,113, large enough for an adult, is of redwood, with the inside of the false back and the outside of the arms paneled in wood that is elaborately ornamented with gilded compo figures in low relief The false back starts well forward on the seat and is supported at the top by the real back, which is an open frame of three vertical struts with rail above In front of the arms and above the front legs rise women's heads in the round, with wings in plain wood, but faces, crowns, and necklaces gilded A noticeable feature of these Egyptian chairs is that the feet do not reach the ground, but are supported on round spools, or bases All of these chairs have front and back lion's legs, carved with considerable fidelity to nature Nos 51,108, 51,109, and 51,110 in the Cairo Museum are wooden bedsteads with footboard but no headboard, upholstered in plaited string, with side rails curved so that the head is higher than the foot and the middle lowest of all The first of the three beds is of wood painted black, with decoration in white paint imitating ivory inlay, the other two have footboards paneled on both sides, with compo figures in low relief, and the plain surfaces of both are veneered in dark wood All three beds have lion's legs supported on bases like the chairs The oldest piece of furniture in the Metropolitan Museum is a very simple wooden couch, only 1 foot high, but 26 inches wide by 63 long It dates from about 3400 B C and has bull's legs with bases beneath Egyptian tables were comparatively small and simple, often mere stands Of chests, coffers, caskets, and boxes, all sizes have been found—some pylon-shaped, with sides sloping inwards towards the top, which is crowned with a projecting cornice, others rectangular, with or without feet, which, if present, are usually a prolongation of the stiles The lids, sometimes hinged, are flat, or unsymmetrically rounded, or rarely gable-shaped

Babylonian and Assyrian Though the country watered by the great rivers, the Tigris and the Euphrates, has from remote antiquity been the home of nations that early reached a high degree of civilization, scarcely a trace remains of the actual furniture of the Babylonians and Assyrians Almost all that we know has been worked out with difficulty from statues and bas-reliefs The only Babylonian example is the stool (throne) that appears in the black-basalt statue of King Gudea, dating from about 3000 B C and now preserved in the Louvre The next example is Assyrian and over 2000 years later—a throne illustrated in the sculptures from the palace of Nimrud, celebrating the victories of King Assurnasirpal about 880 B C It has no back, the side rails of the seat are prolonged into rams' heads, the legs are heavy, with tapering turned bases, and are connected by a low cross rail The bronze throne of the same monarch—a portion of which is preserved in the British Museum, together with the fragment of a footstool—is similar, but with lion's feet facing away from each other The furniture pictured on a slab in the British Museum dating from 668 B C is most interesting King Assurbanipal reclines on a couch, the head of which is curved forward as an arm rest The feet of the couch are the shape of large inverted cones, and the square legs and side rails are decorated with moldings and scrolls, and figures of lions and men The Queen sits opposite the King, on a chair with high straight back and curved arms, resting her feet on a footstool Between the royal pair is a high stand or table bearing the materials for a feast, and at one side is a lower table with the King's sword, bow, and quiver The decoration of chair and tables is similar to that of the

couch Cedar was probably the wood most frequently used in the construction of furniture, but into Assyria, as into Egypt, other woods, such as ebony, teak, Indian walnut, and perhaps rosewood, were imported Ebony and ivory inlays were common

Hebrew The Hebrews undoubtedly borrowed freely both Egyptian and Assyrian forms Beds of wood inlaid with ivory and gold are mentioned as early as the thirteenth century B C, and in the ninth century the prophet Amos censures the rich for using them In the same century the bedroom furnished for an honored guest, the prophet Elisha, contained a chair, a table, a bed, and a lamp Solomon's bed (about 1000 B C) was made of cedar of Lebanon, with pillars of silver and base of gold Solomon's throne had arms decorated with lions, and six lions of gold or chryselephantine work stood on each side of the steps before his throne In early times the Jews seem to have sat at meals, but later reclined, owing to Roman influence

Greek Compared with modern French and Germans, English and Americans, the Greeks and Romans, as well as the Assyrians and Egyptians who preceded them, used little furniture But what furniture the Greeks and Romans did use was splendidly constructed and exquisitely fashioned and finished Unfortunately the climate of Greece and Italy was less kind than that of Egypt, and it is principally to the pictures painted on vases and walls and to marble and terra-cotta reliefs that we must turn for our information The most important piece of furniture in the Greek household of the fifth century B C was the couch or bed, that served not only to sleep on at night, but also to recline on by day while eating or reading or writing Proportions and ornaments were much more beautiful than those of Egyptian couches Turned legs replaced carved animal ones, the height was increased, often making necessary a foot bench or stool, raised ends, or headboards and footboards, and sometimes a back like that of a modern sofa, were added Mattresses and pillows increased the comfort Tables, being used chiefly at meals and not for reading or writing, were made low for the convenience of those reclining on couches Otherwise they resembled modern tables, being square or rectangular with four legs, or round with three connected legs The legs of the tripods (three-legged tables) were apt to be elaborately carved in the form of legs of animals, while the legs of the quadrangular tables were usually turned or plain round or square Among chairs the *thronos* was chief, which in Homeric times had been reserved for the King or the head of the family or to honor a special guest In the fifth century it was also occupied by judges, presiding officers, umpires at games, and other officials It was in form an armchair, with straight back and legs, and usually stood so high that a footstool was necessary In everyday life the *diphros* was more common It was a four-legged stool, without back or arms, and with legs sometimes crossed and sometimes upright Those with crossed legs and flexible seats folded like our modern camp stools The *klismos* was a chair without arms, but with front legs curved forward and rear legs backward, and a back curved to fit the human body The top rail of the back was usually wide and flat and curved, and was supported by two side posts, that were often extensions of the legs. The shape was copied in the modern Empire period and after For storing clothes and household linen the Greeks used chests and boxes that were often beautifully decorated with floral ornament or figure scenes from history and mythology

Roman The Romans used tables with one, three, or four legs, and rectangular, round, or hexagonal tops These were made in many styles, and of many materials, such as wood, ivory, marble, gold, silver, and bronze They were often enriched with carving, inlay, engraving, damascening, and veneer The three-legged stands (tripods) were higher, usually bronze, and elaborately sculptured The legs included terminal and other figures, sphinxes, lions' legs crowned with lions' heads, architectural columns, etc A splendid example, illustrated on Plate 118 of Monaco's *National Museum of Naples* (Naples, 1880), has attenuated lions' legs standing on a triangular base and surmounted by squat sphinxes The deep rim of the top is ornamented with festoons and bucrania in relief Much less furniture has been found at Pompeii than is ordinarily supposed The wood of the beds, couches, chairs, and tables being charred, crumbled away, leaving slight traces, except the bronze and silver mountings and inlays In only one of the dining rooms were sufficient remains of a couch found to make possible its restoration This is No 121 in Monaco s book mentioned above It was 90 inches long, 48 inches wide, and 17½ inches high The legs were richly turned, and stood on molded cross pieces at each end There was no footboard. Inside the headboard fitted a double-curved bolster of wood, the end of which terminated in bronze plates with low-relief foliage ornament and sculptured figures. Of bronze lamps and candelabra Pompeii preserved many that are now in the Naples Museum Some, about 20 inches high, stood on tables, others, from 3 to 5 feet high, stood on the floor, and others hung from the ceiling or from wall brackets The feet of the standards were usually modeled to represent the claws or hoofs of animals The shaft was often a slender fluted or plain column Sometimes it carried one lamp, sometimes it divided into two or more branches, each of which carried a small hanging lamp Some of the standards were adjustable, the upper part sliding up and down in the hollow shaft of the lower part

A seat of honor peculiar to the Romans was the curule chair (*sella curulis*), several bronze pairs of legs of which have been unearthed at Pompeii The curule chair was a folding stool, with legs curved and crossed, dating from the time of the Roman kings, whose special attribute it was Afterward its use was permitted to the numerous officials who inherited one or more of the royal functions On the coins of famous Roman families the curule chair is often pictured in connection with the names of the individuals who held curule offices The example illustrated on Monaco's plate No 119 is 18 inches high, with a seat 23 inches square The wooden stools, side chairs, and armchairs of the Romans resembled those already described under the heading *Greek*, except that cushions were more luxurious and were used more freely, and sculpture was more elaborate Of marble armchairs, as well as of marble round and rectangular tables, numerous ancient examples survive, and have been widely copied by modern makers in both wood and stone Especially interesting is the temple throne in the Louvre, with

seat supported by two sphinxes whose wings form the arms Among marble tables from the peristyles (inside gardens) of Pompeii is a round one, with three massive legs carved to represent lions' legs topped with lions' heads Ancient pictures of Roman wooden armchairs in the Metropolitan Museum are the two that appear in color in the Boscoreale frescoes, both with occupants, and both with turned legs and flat backs—one very clearly showing yellow geometrical ornament painted on the reddish side posts, top rail, and two cross rails of the curved back. Also clearly shown is a very comfortable loose cushion Also in the Metropolitan Museum is an ancient miniature bronze Roman chair with solid arms, the throne upon which the goddess sits in the processional lion-drawn wagon of Cybele, presented to the museum by the late Henry G Marquand

Byzantine At the beginning of the fourth century AD, when Constantinople superseded Rome as the capital of the Roman Empire, it also superseded Rome as the centre of civilization and style Even the barbarian tribes who overran western Europe in the fourth century, wrecking Roman buildings and destroying Roman furniture, looked longingly towards the comforts and luxuries of the ancient Byzantium Even Charlemagne, when setting up his own Holy Roman Empire in the West, getting himself crowned Emperor by the Pope on Christmas Day of the year 800 AD, used Byzantine furniture and furnishings imported direct from Constantinople or made by artisans from there In moving from Rome to Constantinople furniture lost much of its classic grace, becoming heavier and more often architectural, and with flat surfaces of ivory and other rich inlay The old custom of reclining at meals was discarded. Famous examples of ancient Byzantine furniture are the chair of St Peter at Rome, and that of Maximian in the cathedral at Ravenna Of illustrations there are many—the majority of ivory or metal carvings on caskets and other small objects, and especially on consular diptychs, of which there are a number in the British Museum

Gothic. Decoratively, Gothic is the style of the pointed arch Doors and windows and roofs are all topped by lines that meet at an angle. Copied from the architectural lines and from the framework and tracery of stained-glass windows are the lines of decorative carving on Gothic furniture. Where columns and pilasters and capitals are used, they are the slender Gothic columns, often grouped in piers, crowned, not by Doric or Ionic or Corinthian capitals, but by capitals sculptured with domestic foliage naturalistically carved Structurally, most Gothic furniture is simple, made out of boards and planks fitted together at right angles, but ornamentally it is complex, with panels elaborately carved in low relief or carved and pierced Indeed, the Gothic centuries were the paradise of the wood carver, whose figure work, both in low relief and in the round, was often employed to beautify movable as well as fixed furniture and woodwork The Gothic centuries were also the paradise of the iron worker, whose large flat hinges and locks and pulls on chests and cupboards he hammered into exquisite shapes

Most of the ancient Gothic furniture that has been preserved dates from the fifteenth century, and a large proportion of it is church furniture, particularly choir stalls, of which there are notable examples in the Hoentschel collection at the Metropolitan Museum Previous to the fifteenth century the mediæval residences even of kings and nobles were comparatively bare and empty, and what furniture there was had little rest, traveling with the family in wagons when they moved from castle to castle or from city to country Consequently it was so made as to be transported easily and safely, and consisted principally of benches and chests and wardrobes, and tables on trestles, with perhaps a throne chair and a four-poster bed for the master Even the wardrobes and cupboards were practically nothing but chests on benches, or chests on chests A typical late-Gothic bed is the one in the Paris Musée des Arts Décoratifs from Château Villeneuve at Issoire The most showy piece of furniture in the homes of fifteenth-century dignitaries was the sideboard (*dressoir*), and the degree of dignity of the family was supposed to be indicated by the number of shelves "Madame de Charolais," wrote a writer of the period, "only had four shelves to her dresser, while her daughter the Duchess had five" "I have heard it said," he adds, "that no princess except the Queen of France should have five shelves" A typical Gothic chest in the Tours Museum has the principal panel divided into rectangular spaces ornamented with a lozenge molding, each lozenge containing rose tracery Sometimes there is a series of arcades, each containing a kneeling figure Often the side panels are carved in the linen-fold design, and often the front is a series of arcades subdivided by curves and half curves copied from architecture, the spaces between being filled with carved tracery, florals, or figures Important pieces of fifteenth-century Gothic furniture on exhibition at the Metropolitan Museum are the walnut chest, 27 inches high, 29 inches deep, and 66 inches long, with front and ends divided by pilasters into panels that are filled with window tracery, the oak double chair or throne, 10 feet high by 5 feet 6 inches wide, with paneled back, elaborately carved and pierced canopy, paneled arms, and chest seat, the walnut chair, 82 inches high by 29 wide and 19 deep, with the back, and the front of the seat, each divided into two linen-fold panels

Renaissance Of the domestic furniture of the Italian Renaissance, the most important piece was the *cassone*, or ornamented chest, rich not only with carving, but also with gesso and gold and inlay and painted scenes As elsewhere in Europe, so in Italy at this period, brides received a chest filled with linen, often the principal part of their dowry The only difference was that in Italy the chests were larger and more beautiful Sometimes they were low, often they were raised high above the floor on a heavy and elaborately molded base, or on massive feet shaped like claws of lioncels or other animals The painted panels pictured stories from the Bible and from classical mythology, or from the lives of the saints and from mediæval chivalry The arms of the family were apt to be emblazoned on the front. The inlays were floral or geometrical, or in the grotesque style resurrected from the long-buried decorative paintings of ancient Rome The relief ornamentation in the form of flowers and foliage was comparatively low, whether carved in the walnut or the chestnut, or modeled in gesso But towards the end of the sixteenth century, and occasionally before, sculptural baroque influence began to

assert itself, and reliefs became high and bold, and architectural effects complex and bombastic These *cassoni* were not only the most beautiful pieces of furniture in many residences, they were also the most useful In them were stored the household linen and plate, draperies and tapestries, and clothing At home they stood around the room close against the wall and served as settees or tables Abroad they served as trunks Developed from the *cassone* was the Florentine *cassapanca*, a bench with massive sides and back set upon a massive platform, all carved richly but appropriately Occasionally, as on the throne of Giuliano dei Medici, the back was tripled in height and crowned with a heavy entablature that was supported at each end by classic columns, while pilasters marked the seat divisions A special creation of the Italian Renaissance, paralleled only in Switzerland, was the *credenzone*, a narrow cupboard with two front doors, often with small drawers above them, and with framing strongly architectural in character Two-story cupboards, like those developed in the sixteenth century in France and Germany, were seldom used in Italy Writing desks, however, with a folding lid instead of the upper set of doors, were much in vogue

Italian Renaissance beds we know only from paintings and engravings The headboards were high and elaborately ornamented, and the beds often had a canopy above Of Italian Renaissance tables, many have survived—some long and narrow rectangles, others round or hexagonal or octagonal Most of the former are supported at each end, like the marble garden tables of ancient Rome, by thick and elaborately carved flat standards These standards a crosspiece connects, either horizontal and at the base, or decorated and vertical and halfway up The round tables sometimes stand on a single turned or vase-shaped standard, sometimes on three or four wings richly carved, like the standards of the long tables. Of Italian Renaissance stools, with three or four legs and without back, few remain, though many of similar design and later date are still in use They are usually of cheap construction and without ornamentation Most of the stools supported on richly carved flat front and back standards have also a back in the same style Of folding stools of X shape and of chairs derived from them, there were many. The upholstered armchair characteristic of the period has square legs, sometimes connected by plain stretchers close to the floor, sometimes with a high flat carved front stretcher, simpler back stretchers, and low side stretchers, sometimes with two flat shoes carved at the ends carrying the side legs, and no stretcher at all The front legs run up to the flat arms, and above the seat are not infrequently turned The back legs extend vertically into high posts, often with a slight backward slant, that terminate in carved finials The seat is upholstered in leather or velvet or embroidery, often with a valance that boxes it in. Round-headed gilt nails and handsome fringes are freely employed. The backs are covered with a band of upholstery that sometimes leaves only 3 or 4 inches between it and the seat, but usually stops short near the arms

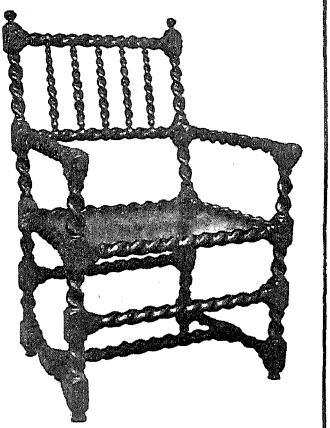
From Italian Renaissance furniture, that of the French Renaissance was directly derived, as a result of the Italian campaigns of the French kings towards the end of the fifteenth century, the designs being either copied exactly or carried out with less exuberance, greater delicacy, and rather more in the round, as would be natural in a country where Gothic wood and stone carving had flourished for centuries

Elizabethan and Jacobean During the whole of the Elizabethan and Jacobean periods armchairs continued to be made with flat richly carved backs, although the Gothic box below was superseded by open-frame construction, square or turned Architectural forms were especially emphasized in chests, a splendid example of which, 39 inches high by 28 deep and 78 long, is illustrated in MacQuoid's *English Furniture*, vol i, p 65 (London, 1904), and in massive four-poster bedsteads ornate with strapwork and other carving, and with the huge bulbous posts that continued in vogue through the Jacobean period An important piece of furniture in the main hall was the two-story court cupboard in which were kept the wine, dry food, and candles used by the master, the servants' supplies being stored in livery cupboards By this time the ancient Gothic movable or "trestle" dining tables had disappeared, their place being taken by tables with four massive legs connected by foot rails, and with top in three leaves, the lower two drawing out from beneath the upper, to be supported on long sliding brackets, thus doubling the size of the table Jacobean furniture is distinctly severer and more restrained than Elizabethan, and the architectural ornament is much less fanciful and much more faithful to classic precedents Furniture frames—particularly of chairs, which were lighter and flat, with squared members—began to be succeeded by turned and twisted ones, particularly in chairs Of Jacobean upholstered furniture, the baronial mansion of Knole is a treasure house. One of the most interesting chairs, and one that is often copied more or less correctly, is illustrated on page 133 of MacQuoid The curved legs cross X fashion, with loose cushion, upholstered seat, upholstered arms, and upholstered back A portrait of James I seated in a chair like this hangs in one of the rooms at Knole In the "King's bedroom" there can be seen the magnificent bed prepared at a cost of £8000 for the entertainment of James I by Richard, third Earl of Dorset Especially noteworthy by contrast is the upholstery that takes the place of the luxurious Elizabethan carving The posts are plain and slight and lost in voluminous folds of rich coral taffetas The curtains are in coral taffetas richly embroidered, and the headboard covered with embroidery in high relief, with floral scrolls in gold and silver surmounted by a royal crown Of the chests and cupboards and wainscot chairs with flat carving often attributed to the Elizabethan period in shops and sometimes in museums, a majority are Jacobean

Louis XIV Between French furniture of the Renaissance and French furniture of the period of Louis XIV, the difference is great The former shows clearly many marks of its Italian origin The latter is absolutely and thoroughly French, and not only French, but baroque, with all the curves and wealth of sculptural ornamentation that characterized the seventeenth century The flat and boxlike shapes of the sixteenth century have been largely replaced by framework in the round Architectural features are minimized, chairs and tables and cabinets and beds are constructed from the use point of view, and as individual entities rather than as

ANCIENT EGYPTIAN

BAROQUE



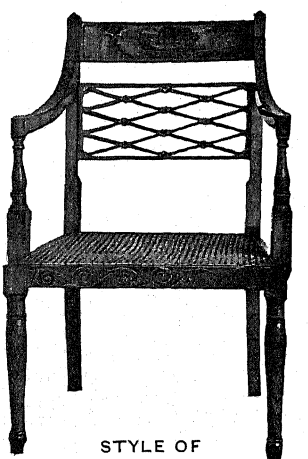
BAROQUE

ROCOCO

LOUIS XVI.

LOUIS XV. (Regence)

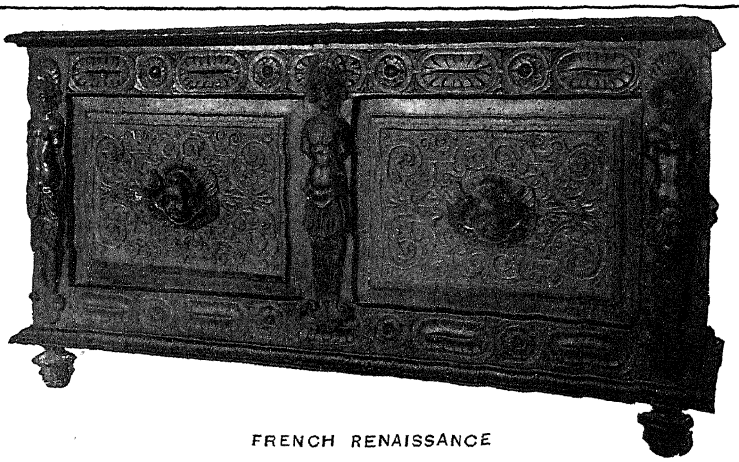
CHIPPENDALE



STYLE OF SHERATON

CHIPPENDALE

TYPICAL CHAIRS

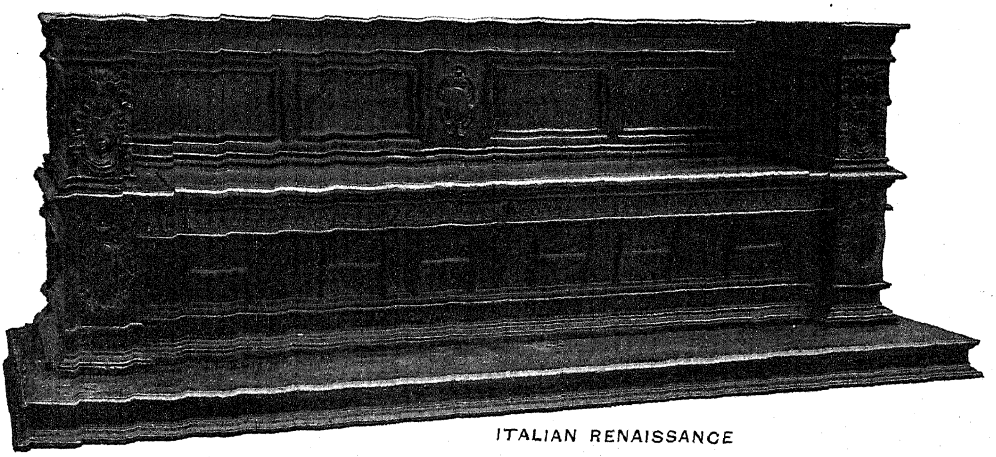


FRENCH RENAISSANCE

FRENCH RENAISSANCE

GOTHIC

ITALIAN RENAISSANCE



ITALIAN RENAISSANCE

REPRESENTATIVE PIECES

an integral part of an architectural whole Of Louis XIV makers of furniture, especially furniture in marquetry, André Charles Boulle stands first From him the so-called buhlwork gets its name A pair of wardrobes (*armoires*) made by him sold recently for over $60,000, and the prices obtained for Boulle furniture at public sales are constantly rising Boulle is noted for his inlays of tortoise shell in elaborate scrolls and arabesques, with ornaments of thin brass and white metal elaborately engraved He also used bronze mounts freely

The Hoentschel collection, presented by the late J Pierpont Morgan to the Metropolitan Museum, contains many characteristic pieces In the style of Boulle, and perhaps by the master himself, is a leather-covered flat desk, with drawers framed in bronze moldings, and with bronze pulls, the middle one showing a human mask At each end of the desk are lions' masks, and on the cabriole legs acanthus mounts A gilded table of the period, much more elaborately carved, of the type used to display vases, bronzes, and statuettes, has a top of richly veined white marble A wardrobe exquisitely carved in low relief has pairs of doors above and below the horizontal molding, separated by an upright pilaster and flanked by pairs of pilasters A faun mask crowns the round pediment at the top Characteristic chairs in the collection have seats and backs upholstered—some in woven tapestry, some in needle tapestry, others in damask-figured velvet, cane, or leather

Louis XV. In the reign of Louis XV the variety of pieces of furniture was greatly increased to meet real or fancied needs Beds and canopies assumed the most varied shapes, and multiplicity of shapes was accompanied by variety of materials The use of gilded wood continued, but the numerous varnishes (*vernis Martin*) developed in imitation of Chinese lacquer by Robert Martin were freely employed On cabinets and commodes and bureaus and bookcases Martin painted Chinese landscapes with mountains suspended in the distance, brilliant and capricious flowers and trees, and rustic bridges Design and execution are exquisite, but some critics object to the lack of relation between ornament and spaces covered—to scenes that are broken by the opening of a drawer, to keyholes that place themselves at random on the tree trunk or mountain.

Marquetry was also developed, by the sons of Boulle and by Cressent, Oeben, Caffieri, Roentgen, and Riesener, into one of the most complicated and exquisite of the arts Rare woods in delicate tones were combined in patterns and pictures marvelously intricate Among the Louis XV pieces in the Hoentschel collection the most characteristic is the gilded wooden candelabrum in the form of a three-arm wall bracket, of the type usually made in bronze or brass, because these metals lend themselves better to the asymmetrical convolutions of shape and the extreme contrasts of light and shade The console in gilded wood with marble top, 25 inches high by 24 wide and 10 deep, is interesting to compare with similar models on Plate 93 of vol ii of Blondel's *Maisons de Plaisance* (Paris, 1738) Also typically rococo, like the designs of Meissonier or Jacques Lajoue, are the tapestry coverings of two Louis XV armchairs with spirited fountains, vases, rocks, and fragments of architecture.

Louis XVI. Especially was the style of Louis XVI influenced by the excavations at Pompeii and Herculaneum The mural decorations and furniture unearthed there 1700 years after Vesuvius buried them, supplied models and designs that were copied with almost slavish fidelity Many books were published illustrating and describing Pompeiian forms and ornament, and the popular phrase in decorative circles was "in the antique style" Important for students of the style of Louis XVI are the Boscoreale frescoes in the Metropolitan Museum These frescoes have brought to New York what Pompadour's decorators went to Italy in search of—the exact truth about ancient interiors and furniture There are none of the bold reliefs so common in the days of Louis XIV In both structure and ornament the straight line and the right angle rule Parallelism of motifs is frequent, and rectangular panels are apt to be narrow Characteristic of Louis XVI furniture panels is the bow of ribbon applied to the top, with ends floating down on each side Fluting is most often longitudinal, sometimes spiral, and is common on chair legs that have the shape of reversed columns, smallest at the base Famous makers of Louis XV furniture, who also became famous as makers of Louis XVI furniture, were Riesener and Roentgen The former was officially appointed "furniture maker to the King," and the latter was generously patronized by Marie Antoinette The Hoentschel collection contains a variety of Louis XVI chairs, and many pieces of furniture with applied metal ornaments by, or closely in the style of, Riesener, Thomire, and Gouthière The last named was noted for the grace with which he chiseled cupids intermingled with garlands of flowers Perhaps the finest example of his work is the clock in the Wallace collection signed by him as *Ciseleur et doreur du Roi*

Empire. Empire furniture was solid and heavy, of mahogany, rosewood, or ebony, adorned with brass or bronze mounts Flat surfaces were often veneered and often inlaid with ivory or ebony Chairs were upholstered in damask, velvets, and prints, and the front legs were mostly straight, the rear legs curved in the classic style The front legs were sometimes fluted, as in the style of Louis XVI, but were heavier Other legs were in the form of bundles of arrows or fasces Beds were low and massive, usually with head and foot boards of the same height Many were like four-posters with the posts pollarded. In state beds the side rails frequently had the shape of an animal or a bird Bolster rolls were common The leading cabinetmaker of the period was Jacob The most important examples of Empire furniture in the Metropolitan Museum are in the collection presented by the parents of the late playwright Clyde Fitch in memory of their son

Charles II, William and Mary, Queen Anne. During the periods of the Commonwealth, Charles II, James II, William and Mary, and Queen Anne, the square and flat Elizabethan and Jacobean furniture shapes were supplanted in England by Dutch-Flemish twists and French cabrioles During the reign of Charles II walnut furniture came into common use in England for the first time, walnut being more suitable for the reversed curves that in oak on the cross grain are likely to chip The frames and linings of cabinetwork continued to be of oak, but outer surfaces were veneered with walnut and had applied moldings of walnut Caned backs

and seats also came into fashion for chairs and settles About 1675 clocks and small tables began to be ornamented with veneer marquetry At first the designs were of Italian inspiration—acanthus-leaved florals, and birds inlaid in brown and buff woods, later, flowers and birds in the more realistic Dutch style, and later still, intricate series of fine scrolls The standard type of small oak tables was the "gate-legged," few examples of which date earlier than Charles II Even in the larger sizes for dining-room use it is comparatively light in appearance, lacking the massiveness of Elizabethan and Jacobean square and rectangular tables The earlier chests of drawers were comparatively small, usually with raised panels or moldings and with bracketed corners or ball feet Later the drawers were mounted on twisted or turned legs fixed to a shallow plinth or joined near the ground by shaped stretchers The "high boys," or "tall boys," that began to appear during the reign of Queen Anne, were made in two sections, upper and lower, for ease of construction and convenience in moving

Georgian Just as in France during the period of Louis XV rooms became smaller and pieces of furniture more numerous, so it was in England during the Georgian period Previously stools and benches and chests had sufficed as seats for the lesser members of the household Now there began to be chairs for all, and interiors not only looked less like Roman temples, but felt less like them—which helps to explain why the Georgian period was so distinctly the age of chairs and afforded so brilliant an opportunity for Thomas Chippendale (q v)

One fact to be emphasized is that the furniture style of the Georgian period was a mahogany style Shortly after the death of Queen Anne mahogany superseded walnut and oak in English furniture shops This had a profound influence on design and construction, the toughness and strength and hardness of mahogany making lighter lines and more delicate carving desirable and possible So that to mahogany, as well as to Chippendale, must be given much of the credit for the strong individuality that marks the furniture of the Georgian period But Chippendale was by no means the only one who made good chairs in the style of Chippendale, nor are the mahogany chairs to be despised that were made before his influence began to be felt Indeed, many of the so-called Hogarth chairs (so called because illustrated in the cartoons of the great caricaturist) are both comfortable and beautiful and are plainly ancestors of Chippendale chairs, though usually without the pierced work in the splat of the back, and apt to look more squat because of the rounder curves of legs and back The early Georgian chairs and other furniture designed by the architect William Kent are heavily architectural and impressively classic in form and construction The backs of Georgian chairs are distinctly lower than those of the Queen Anne period and before

Adam. Even Chippendale, towards the end of his career, bowed before the new classic influence It was his shop that executed the inlaid furniture designed by Robert Adam for Osterly and Harewood MacQuoid publishes in facsimile part of the bill rendered to Lord Harewood's ancestor. The commode described in it, with its intricate inlays in delicate colors and its classic ornaments, is not only characteristically Adam in all its style details, it also marks a new era in wood texture The age of carved mahogany has passed, and the age of inlaid satinwood has begun The surface of the commode is of yellow satinwood veneer, with inlaid swags and wreaths of garrya husks, once bright green but now faded to bright olive The early inlays of the Adam period were on a large scale—classical heads, human figures, vases and broken columns, with marquetry frames of laurel wreaths or plain bands Later the inlays became delicate, consisting principally of thin honeysuckle ornament, foliated scrolls, and, above all else, fan-leaved disks and ovals Of the Adam chairs made by Chippendale for Osterly, six are illustrated by MacQuoid All have the splat of the back running down into the frame of the seat, a relic of the older style Without exception the splats of Chippendale chairs meet the seats, but in later Adam chairs, and in Hepplewhite and Sheraton (q v) chairs, the square, shield, and heart-shaped backs are several inches above the seat, being supported at the sides only Haircloth was a favorite upholstery Hepplewhite writes "Mahogany chairs should have the seats of horsehair, plain, striped, chequered, etc, at pleasure" And also "For chairs, a new and elegant fashion has arisen within these few years of finishing them with painted or japanned work, which gives rich and splendid appearance to the minute parts of the ornaments, which are generally thrown in by the painters"

Colonial. Colonial furniture is even more of a mixture than Georgian, including not only all the English and Dutch styles imported and copied by the American Colonies previous to the American Revolution, but also the French styles that were in vogue thereafter There were, however, some interesting simplifications of Georgian and of Adam, notable in the South and in Massachusetts, and creditable furniture was produced in the styles of Chippendale, Hepplewhite, and Sheraton Of late years the plain, dark-oak "Mission" furniture has been popular

Bibliography. The general history of furniture is traceable in Racinet, *Le costume historique* (Paris, 1888), and in Viollet-le-Duc's *Histoire de l'habitation humaine* (ib, 1875) The illustrated history of furniture by Frederick Litchfield (London, 1892) attempts to cover the whole subject, but is, in the main, a compilation It is valuable for reference For antiquity, consult the plates of the works named in the bibliography under ASSYRIA, EGYPT, and other articles, also Perrot and Chipiez, *Histoire de l'art dans l'antiquité* (Paris, 1882 et seq.) For Japan, consult Morse, *Japanese Homes and their Surroundings* (Boston, 1886); for the New East, Lane, *An Account of the Manners and Customs of the Modern Egyptians* (London, 1871), also the numerous notes added to Sir Richard Burton's *Translation of the Thousand and One Nights* (ib, 1886–87), Chippendale, *Gentleman and Cabinetmaker's Director* (ib, 1754), Hepplewhite, *Cabinetmaker and Upholsterer's Guide* (ib, 1788), Sheraton, *Cabinetmaker's and Upholsterer's Drawing-Book* (ib, 1793), Lessing, *Italienische Mobel des XVI Jahrhundert* (Berlin, 1893), Molinier, *Les meubles du moyen âge et de la renaissance* (Paris, 1897), id, *Le mobilier au XVII et au XVIII siècle* (ib, 1898), Lockwood, *The Pendleton Collection* (Providence, 1904), Ransom,

Couches and Beds of the Greeks, Etruscans, and Romans (Chicago, 1905), Robinson, *English Furniture* (London, 1905), Simon, *English Furniture Designers of the Eighteenth Century* (ib, 1905), Clouston, *English Furniture and Furniture Makers* (ib, 1906), Pollen, *Ancient and Modern Furniture* (revised by Lehfeldt, ib, 1908, South Kensington Museum Handbook), Bajot, *Encyclopédie du meubles* (Paris, 1909), Benn, *Style in Furniture* (London, 1910), Cescinsky, *English Furniture of the Eighteenth Century* (ib, 1910), Foley, *The Decorative Furniture* (ib, 1911), Schmidt, *Mobel* (Berlin, 1913), Lockwood, *Colonial Furniture in America* (New York, 1913) See also BOULLE, CHIPPENDALE, HEPPLEWHITE, SHERATON, ETC

FURNIVALL, fûr'nĭ-val, FREDERICK JAMES (1825–1910) An English philologist He was born at Egham, Surrey, England, Feb 4, 1825, and was educated at University College, London, and at Trinity Hall, Cambridge, where he was graduated B A in 1846 and M A in 1848 He was called to the bar in 1849 For 10 years he was associated in philanthropic work with F D Maurice, teaching in the Workingmen's College Devoting himself to philology, he was instrumental in founding, for the publication of texts, the Early English Text Society (1864), the Chaucer Society (1868), the Ballad Society (1868), the New Shakespeare Society (1874), the Browning Society (1881), the Wiclif Society (1882), and the Shelley Society (1885) He was honorary secretary of the Philological Society after 1854, and for some years edited their great English dictionary He edited numerous works, chiefly through the medium of the above societies, one of the most notable being *A Six-Text Print of Chaucer's Canterbury Tales* (1868–75) This he followed with the publication of a seventh text and the manuscripts of Chaucer's minor poems Under his supervision were published 43 facsimiles of the quartos of Shakespeare's plays His introduction to the Leopold *Shakespeare* has been extensively circulated In 1884 he was granted a Civil List pension of £150 On his sixtieth birthday the University of Berlin conferred on him the honorary degree of Ph D, and on his seventy-fifth birthday he was elected member of the German Shakespeare Society Consult Frederick J. Furnivall, *A Volume of Personal Record* (Oxford, 1911)

FURNIVAL'S INN One of the ancient inns of chancery, affiliated to the more famous Lincoln's Inn It derives its name from Sir William Furnival, whose family became extinct in the reign of Richard II The inn stood in Holborn and came into the possession of the society in the first year of Edward VI (1547) It had a long and honorable existence, but with the other chancery inns fell into disuse and went out of existence about the middle of the eighteenth century For a description of the various inns or guilds of lawyers and their functions, see INNS OF COURT Consult R R Pearce, *Guide to the Inns of Court and Chancery, with Notices of their Ancient Discipline Rules, and Customs* (London, 1855), and Cecil Headlam, *The Inns of Court* (New York, 1909)

FURRER, fur'ĕr, JONAS (1805–61) A Swiss statesman, born at Winterthur and educated at Zurich, Heidelberg, and Gottingen. In 1839, and again in 1844, he was President of the Grand Council, and in 1845 became President of the Cantonal Diet One of the foremost advocates of the new Federal Constitution, he was elected President of the Swiss Confederation upon its adoption, was three times reelected, and was a member of the Federal Council until his death A monument to him was unveiled in Winterthur in 1895 He wrote *Das Erbrecht der Stadt Winterthur* (1832)

FURRUCKABAD, fûr'rŭk-a-bad' See FARUKHABAD

FURS In heraldry (q v), one of the three classes of tinctures, the other two being metals and colors

FURS, fōōrz, **FORS,** fôrz, or **FURANI,** fōō-ra'nē The Moslem negroes dominant in Darfur (Fur Land), in eastern Sudan, between Kordofan and Wadai They are tall (1 730 millimeters, or 67 inches), very black and prognathic, and have woolly hair Their language is related to Nuba and they, with the Nubas and Nubians, are placed with the Nigritians, or negro race once dominant throughout Egyptian Sudan The political history of the Furs, their dynastic wars of the sixteenth century, the prosperity of the monarchy under Solomon Solon at the beginning of the seventeenth, the ascendancy of Islam with the development of agriculture and other industries, the conquest of the country by the slave dealer Zebehr Pasha in 1874, and the Mahdist revolt, 1881–92, are the prominent events in their history during the last 400 years

FUR SEAL See SEAL.

FURST, furst, JULIUS (1805–73) A distinguished German Orientalist, born of Jewish parentage at Zerkow, Posen He was educated for the rabbinical profession and displayed at a very early age a remarkable power of acquiring knowledge He studied at a gymnasium in Berlin and entered the university there, but soon after returned to Posen, in 1825, to take a post as teacher Gradually his convictions led him away from the faith of orthodox Judaism, and in 1829 he abandoned the idea of entering the ministry and proceeded to Breslau, where he continued his Oriental, theological, and antiquarian studies, which were completed at Halle, under Gesenius, Wegschneider, and Tholuck In 1833 he went to Leipzig, where he was first tutor (1833), and from 1864 professor, in the university His labors in the Oriental field now continued uninterruptedly until his death, in 1873 His chief works are the following *Lehrgebaude der aramaischen Idiome* (1835), *Concordantiæ Librorum Sacrorum Veteris Testamenti Hebraicæ et Chaldaicæ* (1837–40), a painstaking revision of Buxtorf's *Concordance of the Old Testament; Hebraisches und chaldaisches Handworterbuch* (1857), and his *Geschichte der biblischen Litteratur und des judisch-hellenistischen Schrifttums* (1867–70) He also wrote a *Geschichte des Karaertums* (1862–65), compiled a *Bibliotheca Judaica* (1849–63), and was editor (1840–51) of *Der Orient*

FURSTENBERG, fur'sten-bĕrk A mediatized principality in southern Swabia, now divided among Baden, Württemberg, and Hohenzollern It gives its name to a noble family, branches of which exist in Baden and Austria The Austrian family consists of the princes of Furstenberg, whose estates are in Bohemia, and of the landgraves of Fürstenberg, who reside in Lower Austria Other branches of the family are the counts of Furstenberg, in Westphalia and Rhenish Prussia Consult *Furstenbergisches*

Urkundenbuch, ed by S Riezler and F L Baumann (2 vols, Tubingen, 1877-91), continued by Baumann and Tumbult (2 vols, ib, 1899–1902), G Tumbult, *Das Furstentum Furstenberg* (Freiberg, 1908).

FURSTENBUND, fur'sten-bunt (Ger, league of princes), THE A league of German princes, formed about 1780, under Prussian leadership, to resist the encroachments of Austria Its founding was almost the last important act of Frederick the Great, and was premonitory of the future strife between Austria and Prussia for preeminence in Germany, but the importance of the union was lost sight of, for the time, in the events of the French Revolution

FURSTENWALDE, fur'sten-val'de A town in the Prussian Province of Brandenburg, situated on the right bank of the Spree, 30 miles east-southeast of Berlin (Map Prussia, F 2) It has a gymnasium, several fine churches, and monuments to Emperors William I, Frederick III, and Prince Bismarck There are manufactures of woolens, electric lamps, wood alcohol, machinery, bricks, and glass The Pintsch Gas Company alone employs more than 1600 hands Owing to its ownership of an adjoining forest, 19 square miles in extent, Furstenwalde is among the richest towns in Germany Pop, 1900, 16,662; 1910, 22,626, chiefly Protestants. It is one of the oldest cities of Brandenburg, having obtained municipal rights in 1285

FURTADO, fōōr-ta'do, FRANCISCO JOSÉ (1818–70) A Brazilian statesman He was born at Oeiras (Piauhy) and was educated at the Academy of Law at Caxias, Province of Maranhão, but from political reasons took his degree at São Paulo A Liberal in politics, he was elected to the Chamber of Representatives in 1847, and again in 1861. At various times he rendered excellent service as a local official and as judge in municipal and commercial courts In 1856 he was made President of the new Province of Amazonas, which rapidly developed under his rule In 1864 he was chosen senator and made Minister of State, in which office he performed efficient service in improving financial conditions

FÜRTH, furt A town of Middle Franconia, Bavaria, 980 feet above sea level, situated at the confluence of the Rednitz with the Pegnitz, 5 miles northwest of Nuremberg (Map Germany, D 4) It has a modern Rathaus, built in Italian style, with a tower 180 feet high, and a seventeenth-century synagogue In the church of St Michael there is an excellent late-Gothic ciborium Furth forms with Nuremberg practically one large manufacturing city Its growth in the last quarter century has been very rapid Among its chief manufactures are mirrors, toys, gold leaf, bronzes, spectacles and optical instruments, lead pencils, lamps, fine lithograph printing, machinery, leather goods, shoes, sheet metal, cabinetwork, furniture, and Venetian blinds It has a gymnasium, a school for woodworkers, an agricultural school, and a library The trade in hops is very active Pop, 1890, 43,206, 1900, 54,822, 1910, 66,553. Although mentioned as early as the beginning of the tenth century, Furth did not obtain a municipal charter until 1818 It was burned by the Croats in 1634 and passed from Prussia to Bavaria in 1806 At the Alte Veste, 3 miles southwest of the city, Gustavus Adolphus was defeated by Wallenstein in 1632 The first steam railway in Germany was that between Nuremberg and Furth, opened in 1835

FURTHER INDIA. See FARTHER INDIA

FURTWANGLER, furt'vĕng-lĕr, ADOLF (1853–1907) A German archæologist He was born at Freiburg and studied in his native city and at Leipzig and Munich In 1878–79 he participated in the archæological excavations at Olympia (q v) He became professor of archæology at Berlin in 1884 and at Munich in 1894 In 1901 he conducted the excavations at Ægina (see ÆGINETAN SCULPTURES) and in 1903 at Orchomenos He came to be recognized as an eminent authority on ancient vases and gems He was a pupil of H Brunn and used even more effectually than Brunn had done the comparative method in the criticism of art He was a dominant figure in archæological circles Besides several valuable treatises on the excavations at Olympia and Ægina, his publications include *Plinius und seine Quellen uber die bildenden Kunste* (1877), *Meisterwerke der griechischen Plastik* (1893, Eng trans, 1894), *Ueber Statuenkopien im Altertum* (1896), *Die antiken Gemmen* (1900), and with Reichhold, *Griechische Vasenmalerei* (1900–04) He also published important descriptive catalogues of vase collections in various cities *Beschreibung der Glyptothek Konig Ludwig I zu Munchen* (Munich, 1900), *Ein hundert Tafeln nach der Bildwerken der kgl Glyptothek zu Munchen* (ib, 1903), and with Urlichs, in 1908, a small edition of his *Meisterwerke*, which has been translated into English by Taylor (London, 1914)

FU'RUNCLE See BOIL

FURY AND HEC'LA STRAIT A narrow channel in the Arctic regions which separates Melville Peninsula on the south from Cockburn Island on the north, and connects Fox Channel on the east with the Gulf of Boothia on the west (Map Canada, O 3). It received its name from the vessels used by Captain Parry, its discoverer, in 1822

FURZE, fûrz (AS *fyrs*, of unknown origin), *Ulex* A genus of plants of the family Leguminosæ The common furze (*Ulex europæus*), also called whin and gorse, is a shrub about 2 or 3 feet high, extremely branched, the branches green, striated, and terminating in spines, the leaves few and lanceolate, the flowers numerous, solitary, and yellow It is common in sandy soils in many of the southern parts of Europe, and in Great Britain, although there it often suffers from the frost of severe winters Furze is sometimes planted for hedges, but is not well suited for the purpose, occupying a great breadth of ground and not readily acquiring sufficient strength, besides it does not, when cut, tend to acquire a denser habit It is useful as affording winter food for sheep, and on this account is burned down to the ground by sheep herders when its stems become high and woody, so that a supply of green succulent shoots may be secured A double-flowering variety is common in gardens A very beautiful variety, called Irish furze, is remarkable for its dense, compact, and erect branches A dwarf furze (*Ulex nanus*) occurs in some places, and is perhaps only a mere variety Furze is sometimes planted as a sand binder, and *Ulex europæus* is extensively established along the eastern coast of the United States from Nantucket to Virginia.

FURZE CHAT. See WHINCHAT.

FUSAGASUGÁ, fōō′-sa-ga-sōō-ga′ A town in Colombia, in the Department of Cundinamarca, 28 miles southwest of Bogotá It is a summer resort of the latter city and has an important coffee industry It is 5800 feet above sea level Pop, 1912, 13,443

FUSAN, fōō′san′, or **PUSAN.** The chief seaport of southeastern Chosen (Korea), 7 miles from the mouth of Nak-tong River, in lat 35° 6′ N, long 129° 3′ E, and the southern terminus of the railway from Seoul, which was opened to that capital (286 miles) early in 1905 (Map Korea, N 4) The port was opened by treaty to Japanese trade in 1876 and to general trade Nov 26, 1883 The native town (Old Fusan) has about 600 houses and 5000 inhabitants, while the Japanese have settled at New Fusan, opposite Deer Island The city is now under control of a prefect appointed by the Governor-General of Chosen Since the annexation the Japanese have far advanced the work of making roads, installing electric lights, and constructing large water works, and the place is very active and prosperous A police system is maintained on the European pattern In 1904 there were 9000 foreign residents, of whom a few were Chinese and Europeans and the rest Japanese, by October, 1906, the number of Japanese had risen to 18,297 There are now over 20,000 Japanese, with 100 Chinese and a handful of Europeans A Chinese consulate is maintained The harbor is formed by several islands, the largest of which is Deer Island, and the largest vessels can come close to the landing places The climate is very healthful, summer bringing perfect sea bathing The neighboring fisheries yield great supplies of herring and cod Lines of small steamers connect Fusan with Nagasaki and other Japanese ports, Shanghai, Chefoo, Taku, Chemulpo, Port Arthur, and Vladivostok The Japanese are now engaged in improving the harbor, for which 3,824,060 *yen* (about $1,900,000) is the estimated cost This is urgent because, by the completion of the Antung-Mukden Railway, Fusan has become the terminus of a world route A submarine cable connects Fusan with Nagasaki The chief imports are cotton goods, petroleum, and Japanese manufactures, the chief exports are hides, beans, dried fish, whale meat, and rice In exports Fusan has exceeded those of Jinsen (Chemulpo) since 1908, but Jinsen still leads in imports In 1911, exports amounted to 5,864,745 *yen* and imports to 12,457,801 *yen*, a total of 18,322,546 *yen*, or 26 6 per cent of the entire Korean trade

FUSARO, fōō-sa′rō, LAKE A lake, 3½ miles long, in the Province of Naples, Italy, ½ mile west of Baja and 1¼ miles south of Cumæ, of which it was perhaps the harbor It has always been famous for its oysters, and the restaurant and gardens of the Ostricoltura and the casino built on the lake by Ferdinand I have many visitors in spring and autumn The ancients called it Acherusia Palus Two canals connect it with the sea, from which it is separated by a line of sand dunes

FUSBERTA, fōōz-bĕr′ta The name of Rinaldo's sword in Ariosto's *Orlando Furioso*

FUSE, or **FUZE** (abbreviation of *fusee*, from Fr *fusil*, gun, steel for striking fire, It, ML *focile*, steel for striking fire). The name of a variety of devices employed for firing explosives in military shells and mines and in blasting operations, etc. The simplest form is the one patented by William Bickford, of Cornwall, in 1831 and known as safety fuse It consists of a powder thread around which is spun jute yarn, this is afterward waterproofed Single fuses have but one layer, and double fuses two layers, of waterproofed yarn Tape fuses are wound with overlapping waterproof tape In wet holes either double fuse or tape fuse is used Fuses are made to burn at a certain rate of speed, and the time of explosion can therefore be regulated definitely by varying the length The rate of burning for good fuse is 1 foot in one-third to one-half a minute In modern practice blasts are most generally fired by electric fuses These are of two general classes In both two naked copper wires pass through a cork or plug of some nonconducting material and project inside a metal cylinder in the open end of which the plug is inserted In high-tension fuses the ends of the wires are not connected, and in low-tension fuses the ends of the large copper wires are connected by a very fine wire, commonly of platinum The metal cylinder is filled with some explosive compound, commonly fulminate of mercury, which explodes with a detonation The outer ends of the two copper wires are connected with two wires which lead to the poles of a battery or other electrical generator, often a magnetic machine

In operation the metal cylinder with its exploding charge is inserted in the mine or blast to be fired, and the wires are connected with the electric generator Upon completion of the circuit the current passes through the explosive compound in the detonator, forming a spark in the high-tension fuse and heating the fuse wire in the low-tension fuse, and in either case causing the compound to explode and thus explode the mine or blast Electric fuses are used for firing submerged mines in warfare In many of the large cities electric firing is now compulsory on account of the greater safety It is also much more effective in open cutwork and where simultaneous explosion of a row of holes is desired Consult H B Gillette, *Rock Excavation, Methods and Costs* (New York, 1904) See BLASTING

Fuses for igniting the bursting charges of projectiles are classified as *time fuses, percussion fuses, combination fuses* A *time fuse* begins to burn at the instant of discharge and continues to burn for a prearranged number of seconds and fifths of a second, at the end of which period the fuse ignites the bursting or detonating charge *Percussion fuses* do not operate until the projectile strikes the ground or target A *combination fuse* contains both a time train and a percussion element It is used in all shrapnel (q v) To produce the maximum effect with the 252 or more bullets contained in a shrapnel case it is important to insure the burst at a certain height above and distance in front of the target For example, at a range of 3000 yards the 3-inch shrapnel should burst at a height of 3 mils (9 yards) above the target and 66 yards in front of it. To accomplish this the time fuse must be set at about 7½ seconds The setting of the fuse is quickly and automatically done by an instrument called a *fuse setter*, attached to the caisson body There are two general systems of *arming* a fuse—one by overcoming, by the shock of discharge, the resistance of a split ring on the *plunger*, the other by releasing the firing pin by means of the *centrifugal* force of *rotation* of the projectile Fuses

depending on the latter principle are called *centrifugal fuses*

The time fuse alone, i e, without percussion element, is no longer used Percussion fuses generally have a plunger held by a safety ring or other device away from a cap of fulminate until, by the shock of discharge, they are *armed*, and the plunger left free to run forward, when the shell strikes its target, and strike the cap Percussion fuses may be inserted either at the *point* or in the *base* of the projectile, and are called, according to location, *base* or *point percussion fuses* Percussion fuses designed to detonate high-explosive shell are called *detonating fuses* Time fuses are held safe, in old models, by a pin which is taken out when inserted in the gun, or in recent models by setting the time ring at "safety", the discharge then drives the plunger on to the cap at once, igniting a train of powder (time train) which burns during flight Communication of flame to charge can be made only through the connecting vent, a small hole set at a point corresponding to the time desired before explosion The percussion principle is combined with this to insure explosion on impact if the time train should fail to act, and the mechanism which is shown in the illustration is situated at the base of the fuse The combination fuse is screwed into the *point* of the projectile

The latest service high-explosive fuses in the United States army are the F A and the *Ehrhardt combination* (21 seconds), which, in addition to the features described above in the F A combination (1907 M), detonates the high-explosive shrapnel on impact, or, if burst in air, detonates the high-explosive *head* when the latter strikes the ground The bursting charge of this shrapnel is composed of a charge of loose black powder (2½ ounces), covered by a steel diaphragm. The latter supports a steel central tube which extends forward to the high-explosive head. The shrapnel is filled with 285 balls secured in a matrix of high explosive In time action the case is not ruptured upon the explosion of the bursting charge, but the head is forced out, and the balls are shot out of the case with an increase of velocity of from 250 to 300 feet per second In the meantime the head continues its flight, detonating on impact If the fuse be set at "safety" or for a time of flight greater than the actual time of flight, this shrapnel may be used in lieu of high-explosive shell Upon impact a high-explosive shrapnel is detonated by means of the percussion element of the combination fuse, the head being detonated first, which detonation causes the sympathetic detonation of the high-explosive matrix surrounding the balls

In the time fuses above described the interval between discharge of shrapnel from the gun and the burst of the shrapnel near the target is regulated by the burning of a compressed powder train in the body of the fuse A different principle is used in recent *mechanical fuses* which in 1914 were under consideration with a view to adoption In these the time element was operated by a clockwork mechanism in lieu of a burning powder train At the shock of discharge the mechanism was set in motion and, at a prearranged number of seconds, insured by the particular setting of the time-ring scale, released a pin which fired a primer which in turn ignited the bursting charge This *mechanical fuse* was first practically developed by the Krupps of Germany

FIG 1

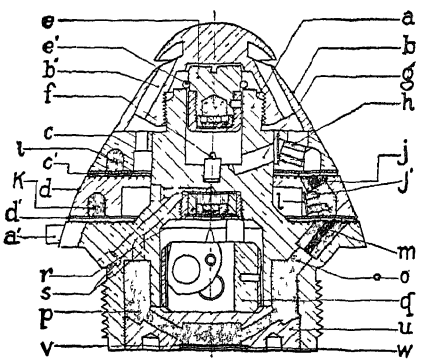
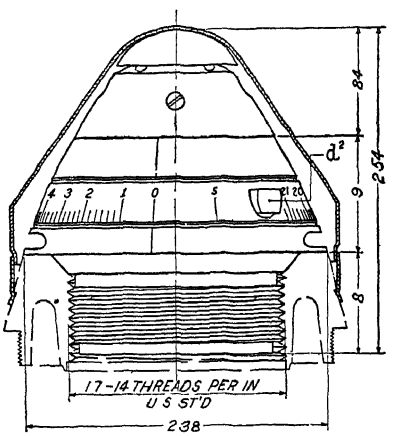


FIG 2



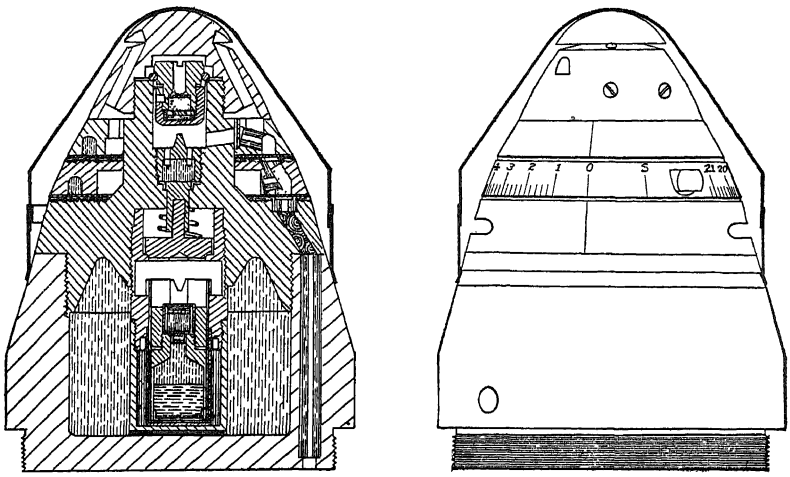
21-SECOND COMBINATION-FUSE MODEL OF 1907 M

a, body, bronze, *a'*, stop pin, brass, *b*, closing cap, brass, *b'*, vents in closing cap, *c*, upper time-train ring, Tobin bronze, *c'*, washer for time-train ring, graduated, felt cloth, *d*, time-train ring, graduated, Tobin bronze, *d'*, washer for body, felt cloth, d^2, rotating pin, brass, *e*, concussion plunger, *e'*, concussion resistance ring, brass, *f*, firing pin, brass, *g*, vent leading to upper time train, *h*, compressed powder pellet, *i*, upper time train, compressed powder, *j*, compressed powder pellet, in vent leading to lower time train, *j'*, compressed powder pellet in lower train-time vent, *k*, lower time train, compressed powder, *l*, brass disk, crimped in place, *m*, compressed powder pellet in vent *o*, *o*, vent leading to magazine, *p*, powder magazine, *q*, percussion plunger, *r*, percussion primer, *s*, vents leading from percussion primer to magazine, *u*, bottom closing screw, brass, *v*, washer for closing screw, muslin, *w*, washer for closing screw, brass

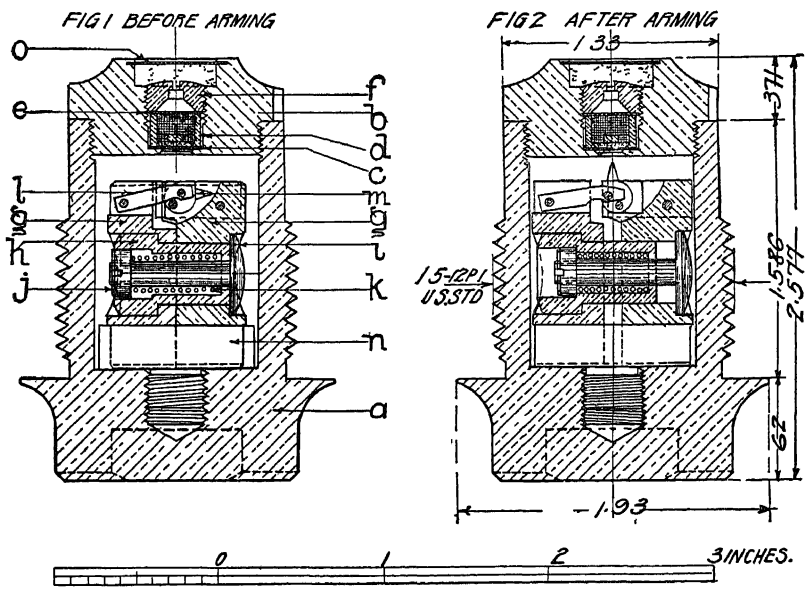
Safety Fuse A device used for conveying ignition from a safe distance to a charge of explosive and consisting of a flexible tube containing a core of fine-grained gunpowder The tube is frequently made from two layers of spun yarn surrounded by tape which has been dipped in a waterproofing composition so that the device may be used in damp mines and other wet places There are many grades, but the exterior diameters of all are such that they fit neatly into the cases of the commercial detonators Safety fuse is sold in 50-foot lengths rolled into

coils, the fuse having previously been dusted with white clay or like body to prevent the sticky surfaces adhering when the fuse is coiled The standard rate of burning stipulated by the United States government in its specifications is one yard in 90 seconds, and fuse should be so made that no portion of it varies more than 10 per cent from this rate A uniform rate of burning is essential in blasting because the blaster in setting a charge cuts a piece of fuse of such length as he believes is long enough to reach from the charge to the face of the coal or rock and sufficiently far beyond to give him ample time, after the outer end of the fuse has been set on fire, to reach a place of safety before the flame of the powder train reaches the detonator or charge Fuse which has been imperfectly made, or which has been squeezed so as to displace the core, or become damp, or cracked, is dangerous Such gunpowder fuse as is described has been called *running fuse* It is now called *burning fuse* to distinguish it from the recently invented *detonating fuse*, consisting of a lead tube, of the diameter of burning fuse, containing a core of compressed trinitrotoluene It is fired by detonation and conveys detonation to charges of high explosives It is styled *cordeau-detonant* and *cordeau-Bickford* A piece of cordeau-detonant extending through the longer axis of a cartridge of explosive when detonated greatly increases the power developed by the explosive Brass tubes containing such a piece of the cordeau-detonant and a detonator are styled *renforts*, or *boosters*

In spherical shell, now obsolete, a train of powder pressed into a wooden tube was cut to length proportionate to time of bursting Ignited at the outer end by discharge, this tube



FRANKFORD ARSENAL 21-SECOND COMBINATION FUSE FOR 3-INCH HIGH-EXPLOSIVE SHRAPNEL



a, body, brass, *b*, closing cap screw, brass, *c*, restraining disk, brass, *d*, primer cup, brass, *e*, primer disk, tin foil, *f*, primer-closing screw, brass, *g*, percussion plunger, brass, *h*, percussion-plunger bushing, brass, *i*, *j*, arming resistance bolt and nut, brass, *k*, arming resistance spring, steel, *l*, firing-pin link, brass, *m*, firing pin, brass, *n*, rotating fin, brass

conveyed the combustion to the charge For ricochet fire over water a water cap of brass with a zigzag channel prevented extinction by immersion An improved fuse, chiefly used for spherical shell, was the Bormann It was of pewter and was punched on a time scale Greater accuracy was obtained by more uniform burning of the better time train. Consult Lissak, *Ordnance and Gunnery* (New York, 1907), and *Fuzes* (Government Printing Office, Washington, 1914) See AMMUNITION, PROJECTILES, SHRAPNEL

FUSEE, fū-zē′ (from OF *fusee,* thread, from ML *fusata,* spindleful, from Lat. *fusus,* spindle) A spirally grooved cone in a watch or chronometer, connected at its base with a chain which is wound up on the pyramidal cone The opposite end of this chain is attached to the box containing the spring, which rotates by the force of the uncoiling spring The object of the peculiar form of the fusee is, as the force of the spring is weakened by uncoiling, to give a longer leverage at the other end of the chain (on the fusee), and so to counteract the loss of power in the spring, thereby maintaining as nearly as possible a uniform rate of driving force With the better skill and knowledge in the manufacture of steel and the material entering into watch springs, and the use of the stored energy of the spring between narrower limits of its complete resiliency, the need of the fusee has disappeared from modern watchmaking See WATCH

FUSEL (fū′zel) **OIL,** or **FOUSEL OIL** (Ger. *Fusel,* spirits of low grade, perhaps from Lat *fusilis,* fluid, from *fundere,* to pour) A frequent impurity in spirits distilled from fermented potatoes, barley, rye, etc, to which it communicates a peculiar and offensive odor and taste and an unwholesome property (See ALCOHOL.) It is obtained from impure spirits in the form of an oily liquid having a penetrating odor, boiling at 131° to 132° C, and having a specific gravity of about 0 811 at 19° C. It has a much stronger intoxicating effect than ordinary alcohol and is highly injurious to health The substances found in fusel oil belong to three classes of carbon compounds, viz, alcohols, acids, and esters The alcohols of fusel oil include· methyl alcohol (wood spirit, CH_3OH), ethyl alcohol (spirits of wine, C_2H_5OH), propyl alcohol (C_3H_7OH), isobutyl alcohol (C_4H_9OH), amyl alcohol ($C_5H_{11}OH$), and hexyl alcohol ($C_6H_{13}OH$) The acids found, either free or combined in fusel oil, include formic acid (HCO_2H), acetic acid (CH_3CO_2H), propionic acid ($C_2H_5CO_2H$) butyric acid ($C_3H_7CO_2H$), valerianic acid ($C_4H_9CO_2H$), caproic acid ($C_5H_{11}CO_2H$), œnanthylic acid ($C_6H_{13}CO_2H$), caprylic acid ($C_7H_{15}CO_2H$), pelargonic acid ($C_8H_{17}CO_2H$), and capric acid ($C_9H_{19}CO_2H$) The principal constituents of fusel oil are the amyl alcohols The composition of fusel oil contained in different spirits varies with the source from which the spirits are derived Fusel oil is generally removed from ordinary alcohol by filtration through charcoal, or by distillation, which is more efficient, but best by a combination of the two processes It must, however, be remembered that the increasing demand for fusel oil itself has made it about six times as valuable as ordinary alcohol Fusel oil is used in making the widely used amyl acetate, in preparing artificial fruit essences, and in the manufacture of alkaloids See AMYL ALCOHOL, DISTILLED LIQUORS

FUSELI, fōō′ze-lē, HENRY See FUESSLI

FUSHIKI, fōō-shē′kē, or **FUSHIGI** A seaport town of Japan, situated on the west coast of Nippon, 32 miles northeast of Kanazawa It was made a free port in 1889 (Map Japan, E 5) Pop, about 19,000

FUSHIMI, fōō-shē′mē A town of Japan, situated on both banks of the river Ujigawa, 3¼ miles from Kyoto (Map Japan, D 6) It is noted as the place where a battle occurred between the Imperialists and the adherents of the Shogun in January, 1868 Pop, about 20,000

FU′SIBLE METAL A term applied to certain metallic alloys characterized by the relatively low temperatures at which they melt Among the more important of these alloys are D'Arcet's metal, Rose's metal, Wood's metal, and Lipowitz' metal *D'Arcet's metal* consists of 8 parts of bismuth, 8 parts of lead, and 3 parts of tin, it melts at 79° C (174 2° F) *Rose's metal* consists of 1 part of lead, 1 part of tin, and 2 parts of bismuth, it melts at 94° C (201 2° F) *Wood's metal* consists of 4 parts of tin, 3 parts of cadmium, and 15 parts of bismuth, it melts at 60° C (140° F) *Lipowitz' metal* consists of 8 parts of lead, 4 parts of tin, 3 parts of cadmium, and 15 parts of bismuth, it melts at 65° C (149° F) Of course, by varying the relative composition of these alloys, a variety of other fusible metals may be obtained, and the melting points of these may be made to answer the purposes for which they are intended For example, the constituents of D'Arcet's metal may be mixed in the proportion of 5 parts of lead, 8 parts of bismuth, and 3 parts of tin, and then the melting point will be 94 5° C (202 1° F). Many fusible metals, especially D'Arcet's, have the property of expanding as they cool, while still soft, and are therefore used for taking proof impressions of dies, each line being exactly reproduced in the cast made of the alloy Fusible metals have also been employed for making safety plugs for boilers When the steam reaches a pressure corresponding to the melting point of the alloy, the plug gives way and the steam escapes Of late years fusible metals have come into extended use for filling the nozzles, or in the form of links for the struts, of the automatic fire-sprinkler systems now installed in all large manufacturing and commercial buildings The alloy usually employed consists of bismuth 4 parts, lead 2, tin 1, and cadmium 1, and melts at about 74° C (165° F) Such a material was said first to have been used in sprinkler heads by Major Harrison Links of fusible metals, first designed by Edward Atkinson, are used in connection with self-operating doors, hatches, etc See HEAT

FUSILIERS, fū′zil-ērz′ (Fr *fusilier,* from *fusil,* musket, It, ML *focile,* steel for striking fire, from Lat *focus,* hearth) Historic regiments of the British army, deriving their title from the fact that they originally carried a lighter fusil or musket than the remainder of the army In point of age the fusilier regiments are next in seniority to the Coldstreams and other guard regiments, and consequently are more or less prominent in the military history of Great Britain In time of peace their uniform differs from other infantry regiments only in the matter of headgear, which in their case is a busby (q v) similar, though smaller, in shape to the one worn by the Foot Guards.

The fusilier regiments are the Royal Inniskillings, the Royal Lancashire, the Royal Scots, the Royal Irish, the Royal Welsh

FUSING POINT See MELTING POINT

FU'SION See HEAT

FUSION (Lat *fusio*, fusion, from *fundere*, to pour) A concept which has played a large part in recent psychological discussion, but the meaning of which cannot be said to be finally and precisely settled It denotes a connection of sense elements of an extremely intimate kind —a connection so close that the resultant compound process seems rather to be a fusion or weld than a mere association of elements The best instance of a fusion is the sound of a musical note or clang, in which a number of tonal elements are blended to give a single resultant perception which, in certain cases, may counterfeit the simplicity of sensation itself See CLANG TINT

Fusion, as thus defined, might be nothing more than a limiting form of simultaneous association (q v). Wundt accordingly classifies simultaneous associations as (1) fusions (intensive, e g, tones, and extensive, e g, sights and touches), (2) assimilations, including discrimination and recognition, and (3) complications, connections of elements from different sense departments (e g, of visual impressions and the organic sensations accompanying bodily movement) As thus understood, fusion does not necessarily imply any change in the connected sensations We may suppose that they are intimately associated, owing to their habitual and constant concurrence some one of them dominates the group, forcing the others into obscurity, so that the whole is apprehended as a whole and not as a sum, but still analysis is possible, and when it takes place the obscure components may turn out to be the same in all respects as they would be if given in isolation Fusion, in other words, might be merely a modern name for James Mill's indissoluble association In point of fact, the question is more complicated

1 We must, in the first place, take account of Wundt's law of psychical resultants This law declares that "every mental complex shows attributes which may, indeed, be understood from the attributes of its elements, when these elements have been once presented, but which are by no means to be regarded as the mere sum of the attributes of these elements" Thus the musical note or chord has attributes, on its perceptual and affective sides, which do not attach to the component simple tones So, too, spatial and temporal arrangement—extension, duration, order in space or time—is conditioned upon a certain collocation of sense elements, but neither space nor time is an intrinsic attribute of any sensation It follows, then, that for Wundt both the intensive and the extensive fusions are, in reality, something more than indissoluble associations, the fusion is not only a whole, but a new whole, something that can be understood but not predicted from the nature of its elemental constituents The law of psychical resultants has been much criticized, on the ground that it involves a belief in "mental chemistry" for which the facts give no warrant, on the ground, more particularly, that it is impossible to derive space from the nonspatial and time from the nontemporal Nevertheless many psychologists of high standing accept the doctrine of secondary contents or secondary attributes (see FORM OF COMBINATION)—the doctrine that associated complexes contain processes or show attributes which are set up by the association as such, and are not discoverable when the elements are separately examined, and this doctrine is but a variant of Wundt's law

2 The laws of tonal fusion have been worked out in great detail by Stumpf This author is very far from accepting a principle of mental chemistry, but, at the same time, he differentiates fusion from simple association According to Stumpf there is in a collocation of tones, after all other hindrances to analysis have been removed, a tendency to fusion, or to a resultant oneness of impression, due to the character of the sense material itself When full allowance is made for habitual association, for misdirection or distraction of attention, for lack of practice, and what not, this "sense phenomenon" of being fused still remains It is not that a new process or attribute is set up, it is simply that, just as visual extents, owing to their intrinsic nature, associate, so do tonal qualities, owing to their nature as tones, fuse or blend This position has recently been disputed, but the evidence for it is too strong to be lightly overthrown

We turn to a consideration of the laws of tonal fusion 1 If we grant Stumpf's postulate, it is clear that we may speak of *degrees* of fusion, according as the tendency to fusion, inherent in tonal material, is more or less completely realized The musical interval of the octave may readily be confused, even by practiced observers, with a simple tone, the octave, then, represents the highest degree of fusion On the other hand, the intervals of the major and minor second and major and minor seventh are rarely taken to be unitary, even by unpracticed and unmusical hearers. these intervals, then, represent the lowest degree of fusion Between the two extremes stand, in order from better to worse fusion, the intervals of the fifth, of the fourth, of the major and minor thirds and sixths, and of the subminor or natural seventh and the tritone We have, in other words, a scale of six fusion degrees within the octave of the musical scale The facts are summed up in the primary fusion law that "the degree of fusion is a function of the vibration ratio of the component tones" (Stumpf) In general the consonances are the best fusions, the dissonances are the worst, and the imperfect consonances occupy an intermediate position

Certain other laws of fusion may be formulated as follows 2 The dependence of intra-octave fusion upon the vibration ratio of the component tones persists over all regions of the musical scale. Above and below the limits of this scale the discrimination of degrees of fusion becomes difficult or impossible 3 The degree of fusion is independent of the intensity, absolute and relative, of the component tones A weak chord fuses as does a loud chord, and a loud tone, accompanied by weak tones, gives the same fusion degree as would be produced if the same tones were all sounded at equal intensities 4 Stumpf asserts that the fusion degrees of intervals wider than the octave are identical with those of the corresponding intraoctave intervals Thus, the "ninths have the same fusion as the seconds, the tenths as the thirds, the double octave and triple octave as the octave" This law is not generally accepted We must, of course, not be misled by the fact that dis-

crimination of the tones of the tenth, as compared with those of the third, is facilitated by the greater distance separating them upon the tonal scale This has nothing to do with degree of fusion, our analysis may be made easier or more difficult by the concurrence of extrinsic conditions, while the degree of fusion remains absolutely the same The question is When analysis of the third and of the tenth has been performed, and the observer is able by effort of attention to single out the component tones in both complexes, do the third tones "go together" (blend) as well as or better than the tenth tones? Is the sense relationship, which we term fusion degree, the same or different in the two cases? The answer seems to be that the tenth, though a better fusion than, e g, the tritone (a member of the intraoctave group lying next below the group of thirds and sixths), is still a worse fusion than the third, to which it corresponds 5 Except in certain specific cases, falling under the laws already formulated, clang tint does not influence degree of fusion 6 Spatial separation of the tones, though it facilitates analysis, does not affect degree of fusion 7 If two tones are simultaneously ideated (reproduced, as sounding together, in memory or imagination), the resultant idea always evinces the degree of fusion that the same tones would show in perception 8 The pitch of a fusion is never that of a tone lying midway between the pitches of the component tones, but rather the pitch of some one of these components "In a continuously sounding compound clang," as heard by a musical observer, "the whole appears to possess the pitch of its deepest tone, even if this be not the loudest" (Stumpf) Unmusical observers are apt to estimate the pitch of a simple clang as somewhat lower than that of a compound clang based upon the same fundamental tone These laws, it should be remarked, are regarded by certain other psychologists as deriving from an "ideal" conception of fusion, since, as they maintain, the impression of fusion is altered in actual experience by such factors as attention, expectation, practice, fatigue, etc They argue further that, besides the acceptance of the single unitary impression as the principal criterion of fusion, we must also posit, as a secondary criterion, the relative difficulty with which the experience may be analyzed into its component parts Those who adopt this position find, of course, that exceptions must be taken in practice to many of Stumpf's laws

Other instances of fusion are to be found in the complexes of organic sensation that form the body of the feelings (see FEELING), in the qualitative taste-smell mixtures (the "taste" of coffee or lemonade), in the perceptions (weight, resistance) mediated both by external skin and by the sense organs of muscle, tendon, and joint, perhaps in all the impressions that we call colors (mixtures of color proper and of light); and, according to Kuelpe, in such affective formations as emotion, impulse, and feeling It is, however, doubtful whether the connections of sensation and affection can be brought under the same conceptual heading as the fusion connections of sensations.

Consult Stumpf, *Tonpsychologie*, vol ii (Leipzig, 1890); Wundt, *Outlines of Psychology* (ib, 1907, Eng trans), id, *Grundzuge der physiologischen Psychologie* (ib, 1910), Kuelpe, *Outlines of Psychology*, trans by Titchener (London, 1909), Titchener, *Experimental Psychology*, I, ii (New York, 1901), Kemp, "Zur Lehre von der Tonverschmelzung," in *Archiv fur die gesamte Psychologie*, vol xxix (Leipzig, 1913)

FUSION DISK, or **FUSING DISK** See METAL-WORKING MACHINERY

FUSIYAMA, fōō'sē-ya'ma See FUJIYAMA.

FUST, fōōst, or **FAUST**, foust, JOHANN (?–c 1466) A German promoter of the invention of printing He was a well-to-do citizen of Mainz and became Gutenberg's partner in the new business of printing He furnished the capital and took a mortgage upon the business, being shrewd enough to realize the value of Gutenberg's discovery Gutenberg, on his part, provided the necessary apparatus In 1455 Fust prosecuted Gutenberg for money advanced, and upon the latter's nonpayment seized enough of the apparatus to cover the mortgage, and continued the business with his son-in-law, Peter Schoffer In 1462, at the sack of Mainz, the workmen were scattered and the secret of the art of printing became common property By 1465 their shop was again active Copies of the work of Fust and his partners are still in existence The best-known publication of himself and Gutenberg is the Latin "Bible of 42 lines," or the Mazarin Bible, of Fust and Schoffer, a *Psalter* (1457), the first book published with a complete date, and especially remarkable for the beauty of the initials, which are printed in red and blue from types made in two pieces See GUTENBERG, PRINTING

FUSTEL DE COULANGES, fus'tĕl' de kōō'lanzh', NUMA DENIS (1830–89) A French historian, born in Paris He studied at the Ecole Normale Supérieure and in Athens After teaching history in Amiens, Paris, and Strassburg, he returned in 1871 to Paris, where he became the successor of Geffroy at the University and in 1878 received a new chair of mediæval history In 1880 he became director of the Ecole Normale His principal works, all sincere but partly blemished by his theories, are *Mémoire sur l'île de Chio* (1857), *Polybe, ou la Grece conquise par les Romains* (1858), *La cité antique, Etude sur le culte, le droit, les institutions de la Grèce et de Rome* (1864, 17th ed, 1900), which greatly exaggerates the influence of religion, *Histoire des institutions politiques de l'ancienne France* (1874–92), a revision of the first volume of the last-named work, in three volumes *La Gaule romaine, L'Invasion germanique*, and *La monarchie franque* (1888–91), awarded the Grand Prix Jean Raynaud For his biography, consult Guiraud (Paris, 1896), and consult Langlois's sketch in *La grande encyclopédie* (ib, 1885–1903)

FUSTIAN, fŭs'chan (from OF *fustaine*, from ML *fustianum*, fustian, from Ar *Fustāt*, a suburb of Cairo, from which the material first came) A cotton corded fabric which has a pile like velvet, but shorter, and which is manufactured in nearly the same manner as velvet, by leaving loops standing upon the face of the fabric, and then cutting them through so as to form upright threads, which are afterward smoothed by shearing, singeing, and brushing. The fabric is used in England for trouserings, etc, and the name has been applied to the lower, coarser grades of velveteens and cordings See VELVET

The different names given to fustian cloths depend upon their degree of fineness and the manner in which they are woven and finished.

Thus, smooth kinds, of a strong twilled texture, are called *moleskins* when shorn before dyeing, and *beaverteens* when cropped after dyeing Corduroy, or king's cord, is produced by a peculiar disposition of the pile threads In all fustians there is a warp and filling, or weft thread, independent of the additional filling thread forming the pile, but in corduroys the pile thread is only "thrown in" where the corded portions are and is absent in the narrow spaces between them For a technical description of fustians, velveteens, and corduroys, see Posselt, *Technology of Textile Design* (Philadelphia, 1895)

FUSTIAN See SYLVESTER DAGGERWOOD

FUS'TIC (from Fr *fustoc*, ultimately connected with Lat *fustis*, stick) A name given to two kinds of dyewood used for producing a yellow color and, with chemical additions, other colors, such as brown, olive, and green The name in France (fustic) seems to be connected with fustet, name of the Venice sumac (*Rhus cotinus*), a shrub found in the south of Europe, and to have been transferred to a very different plant (*Chlorophora tinctoria*), a tree of the family Moraceæ, a native of the West Indies, Mexico, and northern South America Fustic is a large and handsome tree, with wood which is sometimes used in mosaic cabinetwork and turning, but chiefly in dyeing, for which its large content of yellow coloring matter specially fits it Since the color is rather dull, it is more used for producing other colors Old fustic, or yellowwood, is employed for dyeing woolens and also to impart to them, when mixed with indigo and salts of iron, green and olive colors It furnishes a yellow coloring matter termed moritannic acid, which may be obtained in crystals by evaporating its watery solution The bichromates of potash and of lead, as well as some of the coal-tar products, have to a great degree superseded the use of old fustic Young fustic, the wood of *Rhus cotinus*, contains a yellow coloring matter, to which the name "fusteric" has been given It is generally used in combination with other dyes in order to strike some particular tint These terms, "old" and "young," began to be employed about the beginning of the eighteenth century, from the mistaken notion that the one, in small pieces, was the wood of the young tree, and the other, in comparatively large logs, of the same tree in a more mature state The osage orange (*Maclura pomifera*) of North America is nearly allied to old fustic, and its wood also affords a yellow dye. See OSAGE ORANGE, SUMACH, CLADRASTIS, DYEING

FUSULINA, fū'sū-lī'nà (Neo-Lat, from Lat *fusus*, spindle) An important genus of fossil perforate Foraminifera, characteristic of the Upper Carboniferous and Permian limestones. The shell, which varies in size from ¼ to ½ of an inch among the different species, is usually fusiform in shape and is made up of a number of spirally inrolled whorls, of which the chambers are divided into many chamberlets by primary and secondary partitions The known species, about 15 in number, are found in the Upper Carboniferous limestones and often also in those of the Permian age, and in many places are so abundant that they actually constitute the mass of the rocks Such *Fusulina* limestones, appearing as if made up of grains of wheat, are common in certain parts of Europe, Asia, Japan, and are also found in the Mississippian and Southwestern States of the United States and elsewhere in North America The *Fusulina* limestone of Japan has a fine dark-gray ground, with brighter-colored *Fusulina* grains scattered over the surface, and because of its beauty has been extensively cut into vases and other ornamental objects, in which form it may be seen in nearly every collection of Japanese curios *Schwagerina*, with shell of spherical form, is an allied genus of quite similar horizon and distribution See FORAMINIFERA, CARBONIFEROUS SYSTEM

FU'SUS (Lat, spindle) A genus of large gastropod mollusks, the spindle shells, allied to the British whelks and American conchs, and containing many well-known shells For particulars and illustrations, see ROARING BUCKIE, SPINDLE SHELL, WHELK

FUTA JALLON, fōō'ta jà-lŏn' (Fr *Fouta-Djallon*) A large, mountainous region of central French Guinea, West Africa Its area is about 42,500 square miles Owing mainly to the elevation, which is about 4000 feet, and at points exceeds 5000 feet, the climate is rather favorable, and the fine forests lend beauty to the region The Senegal, Gambia, Niger, and other rivers head within its confines Its fertile valleys produce coffee, rice, maize, and cotton The country is well adapted for stock raising, and the number of cattle is considerable. The territory is regarded as among the best in that part of Africa, but it is as yet little developed

Futa Jallon was divided into four administrative circles by the French in 1902, each circle is under a French administrator At the head of the native government are the princes (called almamys, i e, emirs) of the two leading ancient families Each prince rules for two years, and his powers are subject to the action of an assembly of nobles The crowning of the almamy takes place amid great festivities in the sacred town of Fugumba, in the oldest mosque in the land The capital is Timbo, a village of 1500 inhabitants Tuba is the largest town Labe, also, is important The population of Futa Jallon is given as about 700,000, mostly Fulah They came from Senegal in the sixteenth century and subjugated the natives (See FULAH) In 1881 the French, through a representative of the French administration in Senegambia, first concluded a treaty of peace with the almamy of Futa Jallon It was not, however, until 1893 that a French protectorate was established, and a firm footing secured in connection with the government of French Guinea (q v) Consult Dolter, *Ueber die Capverden nach dem Rio Grande und Futa Dschallon* (Leipzig, 1884), Noirot, *A travers le Fouta-Djallon et le Bamboue* (Paris, 1885), De Sanderval, *La conquête du Fouta-Djallon* (ib, 1899), Machat, *Les rivières du sud et le Fouta-Djallon* (ib, 1906), treating the geography and geology of the country

FUTAK, HADIK VON See HADIK VON FUTAK.

FUTA-TORO, or **FOOTA-TORO,** tō'rō'. A territory in West Africa, in the northern part of French Senegal A portion of it was annexed by France in 1860 It is, for the most part, a level and fertile country, with extensive tamarind forests There is iron ore, and considerable pig iron is produced The estimated population is 150,000, chiefly Fulah (q v). A tribe of mixed blood, locally known as Tucoleurs (Two Colors), forms the remainder of the population.

FUTTEHPUR, fŭt'te-pōōr'. See FATHIPUR.

FUTTYGURH, fŭt'tĭ-gŭr'. See FATEHGARH.

FUTURE ESTATE An estate in lands which is limited to come into possession and enjoyment at some time in the future By the common law of England the number of such estates was strictly limited, being confined to reversions and remainders These had the common characteristic of fitting exactly upon some precedent estate less than a fee simple and could not take effect in derogation of a fee nor after an interval of time during which the fee was suspended or in abeyance Thus, a future gift to B one year after A's death, or to C one year from date, would, at common law, have been simply void, as not coming within the description of a remainder See REMAINDER, REVERSION

As a consequence of the ancient practice of conveying land to one man to the use of another, and as the result of the Statute of Uses, passed in the twenty-seventh year of Henry VIII (1535), and of the Statute of Wills, five years thereafter, new classes of future estates of a more flexible character became possible These were known as springing and shifting uses and executory devises They consisted in future limitations, not coming under the description of remainders and reversions, but taking effect in the future without a preceding "particular" estate, or in derogation of a preceding estate in fee Thus, a gift of land to the use of B, to take effect on the happening of some future event, or to the use of A and his heirs, and, in the event of B's returning from abroad, to the use of B and his heirs, would vest a future estate in B, the former as a springing use (q v) and the latter as a shifting use (q v) Either of these estates, if given by last will and testament, would take effect as an executory devise (q v) Though these distinctions are still valid in England and many of the United States, they have in many jurisdictions been abolished by statute, while in a few States, as in New York, all future estates of real property have been put on the same footing, even the fundamental distinction between remainders and the executory limitations above described having been done away with In general, therefore, future estates of all kinds can now be directly created by deed as well as by last will and testament

Strictly speaking, there can be no such thing as an estate in personal property, and it was formerly the law that the ownership of such property was indivisible This meant that if a chattel, as a jewel or a leasehold estate, was given to one for life, it became his absolutely, and no legal interest therein could be given over to any one else But by a series of judicial decisions of the last century in England and America this narrow rule of the common law has been changed, and it is now possible to create legal future estates, or interests, in personal property as well as in real Such interests are not deemed to be remainders, however, even when they take effect, like legal remainders of real property, upon the determination of a precedent interest therein, but are classified as future interests of the executory type, like springing and shifting uses, and the like.

The foregoing enumeration exhausts the list of the future estates generally recognized in our legal system Other rights in land looking to a future enjoyment thereof may, indeed, exist, but they all fall short of being estates or interests in the land, as those terms are understood in law Of this character are rights of entry for condition broken, rights of forfeiture for waste or other cause, rights of escheat and eminent domain, and the right remaining in one who has conveyed away a qualified or limited fee None of these reach the dignity of future estates, though one of them, the right of entry for breach of condition, has been rendered alienable by statute in England and a few of the United States Of an intermediate character, also, are the respective interests of husband and wife in the estate of the other, while the relation of coverture continues The "inchoate" dower right of the wife and the curtesy "initiate" of the husband are not, strictly speaking, future estates, but they approach closely to that description See ESTATE

Future estates of all kinds are generally alienable by deed or will and, if estates of inheritance, are transmissible by descent just like present estates Though the property in which the estate is claimed is for the time being in the lawful possession of another, the future estate is secure from loss or destruction It is unaffected by any conveyance or other act of absolute ownership which the present, or particular, tenant may choose to exercise over it In this respect it differs from a mere equitable interest, present or future, in property, which may be lost by conveyance of the property to an innocent purchaser But all future estates that are contingent in character are subject to the rule against perpetuities, which renders void any future interest which is not to vest within a lifetime and 21 years after the date of the creation of the estate See PERPETUITY

FUTURISM See POST-IMPRESSIONISM

FUXUM See FOIX

FUZE. See FUSE

FYFFE, fif, CHARLES ALAN (1845–92) An English historian, born at Blackheath, Kent and educated at Balliol College, Oxford, where he graduated in 1868 He took his M A in 1870 and in 1871 was elected a fellow of University College and later was appointed bursar, which position he held for many years He acted as war correspondent for the London *Daily News* during the early months of the Franco-Prussian War and in the same capacity was in Paris during the Commune, narrowly escaping execution as a spy. He studied law at Lincoln's Inn and the Inner Temple in 1873–76, and in 1877 was admitted to the bar, but never practiced Fyffe was a Radical in politics, one of the founders of the Free Land League, and an unsuccessful candidate for Parliament from Oxford in 1885 In 1875 he published a small *History of Greece,* in a series of *History Primers* His *History of Modern Europe,* published in three volumes in 1880, 1886, and 1890, is a vigorous and careful account of the political history of Europe from the outbreak of the French Revolution to the Treaty of Berlin in 1878

FYNE, fin, LOCH An arm of the sea running north and northeast from the Sound of Bute, in the south of Argyllshire, Scotland, to beyond Inverary, in the north, and bounded by the District of Cowal on the east, and by those of Argyll-Knapdale and part of Cantire on the west (Map Scotland, C 3) It is 43 miles long, 2 to 8 miles broad, and 40 to 70 fathoms deep, and receives at its head the waters of the Fyne River and a little farther south the Shira and Aray It has important herring fisheries, and it is much visited in the season by pleasure seekers

FYRD, fērd An old English term for *mili-*

tia, i e, the men of a nation able to bear arms, used during the Anglo-Saxon period as early as the year 605 The individuals forming the fyrd were usually employed for local defense only, and were subject to severe penalties, including fine and forfeiture of land, in case they failed to report for duty See MILITIA

FYT, fīt, JOHANNES (1611–61) A Flemish animal and still-life painter and etcher He was born in Antwerp, where he was a pupil of Jan van Berch and Franz Snyders In 1629 he became member of the Guild of St Luke, and in 1650 he was elected member of the Guild of the Romanists, becoming dean in 1652 In 1631 he visited France and Italy, where he spent some time studying in Rome, returning to Antwerp in 1641 His painting is characterized by sunny effects, harmony of color, and remarkable detail, especially in the painting of the fur of animals and the plumage of birds His subjects embrace animals hunting, fighting, and dead, besides still-life pieces He has been named the greatest animal painter of the Flemish school after Snyders, who excels him in line but is his inferior in pictorial effects He was associated with Willeborts, Schut, and others, Willeborts painted the figures, while Fyt added the animals He died in Antwerp in 1661 His etchings include three series of animal subjects, they show the same vigor and animation in style as his paintings He is represented in nearly all the museums of Europe There are four paintings by him in the Louvre and three fine "Dead Game" pieces in the Metropolitan Museum, New York, the "Bear Hunt" and the "Boar Hunt," two of his masterpieces, are in Munich, and he is especially well represented in Vienna

FYZABAD, or **FAIZABAD**, fī'za-bad' A division of Oudh, United Provinces, British India (q v) (Map India, E 3) It is watered by the Gogra and Gumti, and embraces a region rich in antiquities Agriculture is in an advanced state of development, rice, wheat, and other grains are extensively cultivated, while cotton, tobacco, opium, and indigo also are produced Area, 12,113 square miles Pop, 1901, 6,855,991, 1911, 6,646,362 Capital, Fyzabad (q v)

FYZABAD, or **FAIZABAD.** The capital of a division of the same name, United Provinces, India, near the Gogra, 78 miles east of Lucknow (Map India, E 3) With its ancient suburb, Ayodhya, the Jerusalem of the Hindus, which is said formerly to have covered 96 square miles, it contains 36 Hindu temples, 114 mosques, an Imambarah, and a vast number of ruins overgrown by jungle The great fair of Ramnaumi is annually attended by half a million pilgrims Its prosperity, which had declined after the death of Bahu Begam, in 1816, revived under British rule, is again decreasing An important trade in wheat and rice is carried on It has large sugar refineries The city is the headquarters of a British commissioner. Pop, including military cantonment, 1901, 75,085, 1911, 54,655

G

The seventh letter and fifth consonant in the Græco-Roman alphabet The greatest innovation made by the Romans when they took over the Greek alphabet was in the development of G Up to the middle of the third century B C the letter C was employed in Latin inscriptions for both *c* and *g* The familiar abbreviations C and CN for Gaius and Gnæus prove this fact beyond question The inconvenience, however, of having only one character to distinguish the two sounds made necessary a slight differentiation, which finally gave the form G for the sonant, or voiced, guttural (*g*), and C for the surd, or voiceless, guttural (*c hard*) The new character first appears in the epitaph on Scipio Barbatus, which Ritschl thinks cannot have been carved later than 234 B C This G took the seventh place in the alphabet, which had been occupied by Z in the old Italic alphabet. (See ALPHABET, LETTERS) With reference to the name it may be added that the Greek designation *gamma* has been usually supposed to be an adaptation of the Semitic *gaml* or *giml*, and to mean a 'camel.' But in fact *giml* and *gaml* mean nothing as words, and although either may be the Semitic triliteral root meaning ripe,' there is no word of any such form from that root The modern lower-case or small-letter *g* arose by gradual development from the symbol ȝ, which already appeared in the semiuncial style as early as the sixth century of the Christian era Consult Prou, *Manuel de paléographie* (Paris, 1910)

Phonetic Character In English, *g* has the values (1) of a voiced guttural, or velar, plosive made by voiced breath being checked between the body of the tongue and the palate, as in *got, organ, glad,* (2) of the so-called "soft" or palatal *g*, consisting of a combination of the voiced dental and the dental fricative (*d* + *zh*), as in *generous, gentle* (this sound is sometimes aided orthographically by the addition of a *d*, as in *bridge, judge*), (3) in some words taken from French it has the value of *zh*, the voiced dental fricative, of which the phonetic symbol is *z*, as in *mirage, rouge,* (4) it is sometimes silent before *n* and *m*, as *gnaw, sign,* (5) in the combination *ng* at the end of syllables it denotes merely that the *n* is a guttural and not a dental nasal (this sign is indicated *ŋ* by phoneticians and is called the voiced velar, or back, nasal), (6) the combination *gh* has frequently the sound of *f*, as *slough, laugh,* or of *w*, as *bough* The voiced plosive *g* comes chiefly from (1) Indo-Ger *gh*, as in Eng *goose*, Ger *Gans*, AS *gōs*, Lat *anser* (orig **ghanser*), Gk χήν, Skt *hasás*, Eng *guest*, Ger *Gast*, AS *giest*, Goth *gasts*, Lat *hostis*, Eng *sty*, go upward, Ger *steigen*, AS *stīgan*, Goth *steigan*, Lat *vestigium*, footprint, Gk στείχειν, go, Skt *steghnōmi*, (2) the *g* of words which have come into English from other languages, as *grain*, Lat *granum* The following are some of the changes between *g* and other letters *acre*, Ger *Acker*, Lat *ager*, Gk ἄγρος, Skt *ajra*, or again *knee*, Lat *genu*, *kin*, Lat *genus*, Gk γένος, Skt *janas*, *yester* (day), Ger *gestern*, Lat *hesternus* There is a constant tendency towards palatalization of *g*, as in the Old English participles in *y* (initial), corresponding to Germanic *ge* A modern instance of this tendency is seen in the pronunciation of *Morgen* as *Moryen* in the so-called *Berliner Dialekt* of Germany The Normans in England could not sound the *w* and so substituted for it *gu* This gives doublets in English like *guard* and *ward*, *guarantee* and *warranty* G sometimes disappears, as in Eng *enough*, Ger *genug*, and Eng *master*, Lat *magister*

As a Symbol Ḡ in music is the fifth tone of the natural diatonic scale of C, and in the treble clef is written on the second line, or in the first space above In the bass clef it stands in the first line, or in the fourth space As a mediæval Roman numeral it stands for 400, and with a line over it (Ḡ) for 400,000

GAÁL, gal, JÓZSEF (1811–66) An Hungarian author He was born at Nagy Károly in 1811, studied at the College of Buda and at the University of Pest, and entered soon afterward the administrative career, being attached to the Hungarian Council of Lieutenancy He played a somewhat important part in politics and took part in the revolution of 1848 Gaál began writing early and proved equally successful when gossiping in the columns of Kossuth's famous *Pesti Hirlap*, translating a masterpiece of Cervantes, filling the periodicals with tales and novels, or furnishing original works for the National Theatre The sketches of country life as it was, and as it still continues on the vast plains of Hungary, are nowhere more vividly and more truly exhibited than in Gaál's comedies and tales The following are some of Gaál's original compositions *Szirmay Ilona*, a novel in two volumes (1836), *Peleskei Notarius* (The Notary of Peleske, 1838), a comedy in four acts, based on a novel by the poet Gvadányi, *Szvatopluk*, a tragedy in five acts Tales *Pusztai Kaland* (An Adventure on the Hungarian Prairies), *Tengeri Kalandaz Alfoldon* (Seafaring Adventures in Lower Hungary), *Hortobágyi éjszaka*

(A Night on the Heath of Hortobágy) During the sojourn of the Hungarian Diet at Debreczen (1849), Gaál was editor of a journal combating extreme radical views As early as 1837 he was made a member of the Hungarian Academy Consult the edition of Gaál's novels and tales by Badics (Budapest, 1880–82)

GABARET, ga'ba'rā', JEAN DE (c 1620–97) A French colonial governor, born on the island of Ré, of a family famous in French naval history, his father, Mathurin (died 1671), and his brother Louis (who was killed at Tobago) being brave sailors He was made a commodore in 1653 and lieutenant general of naval forces in 1689 At the siege of Tobago, West Indies, he was the first to enter the harbor (Feb 27, 1677) He fought in the battle of La Hogue (May 29, 1692) and in 1693 was appointed Governor of Martinique, which he successfully defended against the English He improved the "Black Code" and (in the interest of the slave population of the island) submitted a report which outlined a method of gradual emancipation, recommended the deportation of the negroes to the French possessions in South America, where they might prove valuable colonists, and pointed out that white immigration to Martinique would thus be encouraged

GABB, WILLIAM MORE (1839–78) An American paleontologist, born in Philadelphia, where he attended the Academy of Natural Sciences From 1862 to 1865 he was in charge of the paleontological branch of the geological surveying expedition in California under Josiah D Whitney, and in 1868 and 1873 undertook geological surveys in Santo Domingo and Costa Rica His principal publications, which refer chiefly to these expeditions, include the first and second volumes of the *Geological Survey of California* (1864), "On the Topography and Geology of Santo Domingo," in *Transactions of the American Philosophical Society* (1873), "On the Topography of Costa Rica, with Map," in *Petermann's Mittheilungen,* and "Ethnology of Costa Rica," in the *Transactions of the American Philosophical Society*

GABBATHA, găb'a-tha (Gk Γαββαθά) The name of the place to which Pilate, after having examined Jesus, brought him from the Prætorium, to pass judgment upon him before the people (John xix 13) The Aramaic word, of which the Greek is a transliteration and which so far has not been found in any extant Aramaic documents, is apparently derived from the radical *gābhābh,* whose primary meaning is 'curved' or 'convex,' and might indicate that the place itself was on a rounded eminence or under a dome or arched balcony If this etymology be correct, the term cannot be considered, as is assumed in the New Testament passage, the equivalent of the Greek term Λιθόστρωτος, *Lithostrōtos,* which implies a level tessellated surface

The location of this place depends upon what is to be understood by the "Prætorium" If this was Herod's palace, as in Acts xxiii 35, then the "Pavement" would most probably be the inner open court of the building, if it was the Antonia, then it would be an open space, most likely outside the building Recent excavations near the Ecce Homo Arch have uncovered an extensive area of Roman pavement, from which the ground sloped rapidly away on the east and the west and which must have been immediately adjoining, if not actually within, the Antonia. Parts of the pavement were evidently used for traffic, but most of it is smooth, as though marked off from traffic and used for other purposes

GAB'BRO (dialectic It, of obscure origin) A crystalline igneous rock of granitic texture, composed largely of the minerals lime-soda feldspar and pyroxene, but often containing also a considerable quantity of olivine The average chemical composition is silica, 49 per cent, alumina, 20 per cent, iron sesquioxide, 3 per cent, iron protoxide, 7 per cent, magnesia, 7 per cent, lime, 9 per cent, soda, 3 per cent, water, 2 per cent The proportions of the constituent feldspar and pyroxene in gabbros vary widely, hence they grade towards peridotite and pyroxenite (qq v) on the one hand by reduction of the proportion of feldspar, and on the other towards anorthosite (q v) by reduction of the proportion of pyroxene Gabbro which contains olivine is distinguished as olivine gabbro· The usual pyroxene of gabbro is diallage, but when the place of this mineral is partially or wholly taken by hypersthene the rock is known as a hypersthene gabbro, or norite The processes known as weathering tend to change both the olivine and pyroxene of olivine gabbros into the hydrated magnesium silicate serpentine, hence olivine gabbros are very often found to alter to serpentinous or serpentine rock (q v), the alteration is even more common and complete in peridotite (q v) Gabbros have a very large development in the Adirondacks and in the Lake Superior region of America and in the Western Isles of Scotland The word "gabbro" is derived from the Italian and is said to have been introduced into geological science by Von Buch in 1809

GABELENTZ, ga'be-lĕnts, HANS CONON VON DER (1807–74) A distinguished German philologist, born at Altenburg He studied at the universities of Leipzig and Gottingen (1825–28) and held various positions in the Government of Saxe-Altenburg, rising in 1848 to the head of the ministry He devoted himself to the study of little-known languages, Asiatic, African, and American, and strove to lay a foundation for the comparative study of all languages In his work *Ueber das Passivum* (1860) he drew examples from 208 tongues Among his other works are *Eléments de la grammaire mandchoue* (1833), *Grundzuge der syrjanischen Grammatik* (1841), a critical edition of the Gothic translation of the Bible by Ulfilas, with a Latin translation and a Gothic glossary and grammar (in collaboration with J Lobe, 2 vols, 1843–46), *Ueber die melanesischen Sprachen* (2 vols, 1860 and 1873) He was one of the founders of the *Zeitschrift fur die Kunde des Morgenlandes* and contributed to it and other periodicals many papers upon little-known languages and general philological science

GABELENTZ, ga'be-lĕnts, HANS GEORG CONON VON DER, son of Hans Conon von der Gabelentz (1840–93) A German philologist, born at Poschwitz, Saxe-Altenburg After studying law in Jena and Leipzig and holding several state positions, he was appointed in 1878 professor extraordinary of Oriental languages at the University of Leipzig and to a similar chair in the University of Berlin in 1889 Besides numerous contributions to the philological journal which his father had founded, he translated a Chinese work on "The Absolute," entitled *Thai-Ki-T'u,* and published (1876) a grammar of the

Chinese classical language, *Chinesische Grammatik* (1881), *Die Sprachwissenschaft* (1891), and *Handbuch zur Aufnahme fremder Sprachen* (1892)

GABELLE, ga'bĕl' (Fr, probably from AS *gafol*, tax, from the Celtic, cf Corn *gavel*, tenure, Ir, Gael *gabhail*, conquest, from *gab*, to give, to take, connected with Goth *giban*, Ger *geben*, Eng *give*) A term originally used in France to designate every kind of indirect tax, but more especially the tax upon salt This impost, first established in 1286, in the reign of Philip IV, was only temporary, but was declared perpetual by Charles V Salt was made a government monopoly, and every family in the kingdom was obliged to buy a certain weekly amount at a fixed price The price varied in the different provinces Those that were most heavily taxed were called *pays de grande gabelle*, and those that were least heavily taxed, *pays de petite gabelle* *Les provinces franches* and *les pays rédimes* were those provinces which had purchased exemption The tax was unpopular from the first, and attempts to collect it occasioned frequent disturbances It was finally suppressed in 1790 The name *gabelous* is, however, still given by the common people in France to tax gatherers

Consult J J Clamagéran, *Histoire de l'impôt en France 1876* (Paris, 1876), and A Gasquet, *Précis des institutions politiques de l'ancienne France* (2 vols, ib, 1885)

GABELSBERGER, ga'bels-bĕrg-ēr, FRANZ XAVER (1789–1849) The founder of stenography in Germany He was born and educated at Munich and was long engaged as private secretary in the Ministry of the Interior in that city After publishing various textbooks and charts for schools, he devoted himself exclusively to stenography, repeatedly gave public exhibitions of his proficiency, and ultimately received the unqualified commendation of the Academy of Sciences His method is based upon phonetics The system has been widely adopted in Germany and has been introduced also into about 25 European languages His principal works are *Anleitung zur deutschen Redezeichenkunst* (1834, Eng trans, by Henry Richter, under the title of *Graphic Shorthand*, 1899), which has furnished the basis for all further investigations of the kind in Germany and has passed through numerous editions, *Neue Vervollkommnungen in der deutschen Redeschreibekunst* (2d ed, 1849), *Stenographische Lesebibliothek* (1838) A monument was erected to his memory in Munich in 1890

GAB'ERLUN'ZIE MAN, THE A Scottish ballad which belongs to the early sixteenth century and has been ascribed to James V It concerns the fortunes of a wandering beggar

GABE-RUD See DIYALA

GABES, ga'bĕs, or **CABES** (anciently, Tacape) An important seaport and capital of the Tunisian Province of Arad, situated on the Gulf of Gabes, on the eastern coast of Tunis (Map Africa, F 1) The harbor is too shallow for larger vessels, but the trade of the port is nevertheless of considerable importance and consists of dates, henna oil, hides, wool, and alfa The site of the Roman Tacape, it consists of several villages and contains an Arabic school, a French garrison, and is the seat of the Governor of the province The population was 12,600 in 1896 and has increased to about 20,000.

GABES, GULF OF An open gulf of the Mediterranean, on the east coast of Tunis It is about 70 miles in width and extends between the islands of Kerkenna and Jerba (Map Africa, F 1) The town of Gabes is at the head of the gulf

GABH'RA, BATTLE OF A battle which the tribe of Fionn waged, about 284 AD, against its enemies, as recounted by the Irish-Gaelic legends

GABII, gā'bĭ-ī An ancient city of Latium, 12 miles east of Rome It plays an important part in Roman legend, in particular in the story of its capture by Tarquinius Superbus (Livy, i, 53–54) After this it is seldom mentioned, and, though it was later a municipium, it gradually fell into complete decay It again became prosperous during the reign of Tiberius, when its cold sulphur springs attracted attention, and after the time of Hadrian seems to have flourished until the third century, when its name disappears except as the seat of a line of bishops until the ninth century The principal relic of the ancient city is a ruined temple, probably dedicated to Juno, on a hill now crowned by the ruins of the mediæval fortress of Castiglione Excavations on the site have yielded many noteworthy works of art, among these are the "Artemis of Gabii," now in Munich, and busts of Agrippa, Tiberius, Caligula, Nero, Trajan, and Hadrian Quarries of an excellent building stone, peperino, which was largely used by the Romans, existed in the neighborhood of Gabii The Romans termed a peculiar method of girding the toga *cinctus Gabinus*, Gabine cincture It seems to have differed from the ordinary method in that instead of the belt a portion of the toga was itself the girdle, while another part of the toga was drawn over the head This mode of wearing the toga was used on certain solemn occasions, such as the opening of the Temple of Janus on a declaration of war and at certain sacrifices, it has been interpreted as proof of a period of warfare between Rome and Gabii A treaty of peace between Tarquinius Superbus (q v) and Gabii, written on a bull's hide, was said to be extant in the first century B C

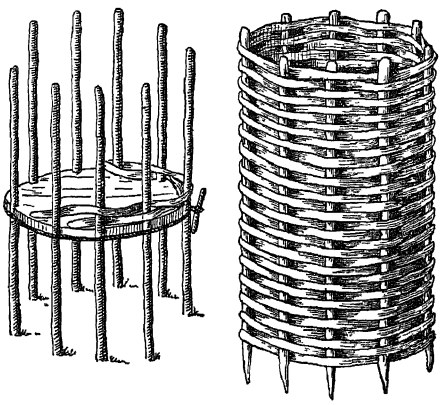
GABINE CINCTURE, CINCTUS GABINUS See GABII

GABIN'IAN LAW. See GABINIUS, AULUS

GABIN'IUS, AULUS (?–c 47 B C) A Roman politician As tribune of the plebs, 66 B C, he proposed and carried the famous Gabinian law, conferring upon Pompey the command of the war against the pirates, and control not only of the Mediterranean but over the adjacent countries for 50 miles inland Afterward he was prætor (61), and became consul in 58, when he supported the banishment of Cicero At the end of his consulship he went to Syria as proconsul (57) and, having invaded Egypt against a decree of the Senate, restored Ptolemy Auletes to the Egyptian throne (55) Since, during his absence in Egypt, Syria had been much disturbed by robbers, to the financial loss of the *equites* (see EQUESTRIAN ORDER), who farmed the revenues there (see PUBLICANI), on his return to Rome (54) he was accused of treason and extortion He was acquitted of treason, but, though defended by Cicero, was condemned to perpetual banishment for extortion He was recalled by Cæsar in 49, and in the next year was sent to reenforce Q Cornificius in Illyricum, where he died Consult Stocchi, *Aulo Gabinio e i suoi processi* (Torino, 1892).

GA'BION (OF, Fr. *gabion*, from It. *gabbione*,

large basket, gabion, augmentative of *gabbia, gaggia*, cage, Fr, Eng *cage*, from Lat *cavea*, hollow place, from *cavus*, hollow) A device for strengthening earthworks, in field or temporary fortifications It may be constructed of whatever materials the circumstances afford, but usually it is a hollow cylinder of basketwork, open at both ends, in diameter about 24 inches, in height 3 feet It has the advantage of being readily portable and capable of many uses It is used in the construction of *revetments*, which are coverings or facings placed upon an earth slope to enable it to stand at an inclination greater than its natural inclination The advantages of the gabion revetment are very



GABION

great. It can be put in place without extra labor and faster and with less exposure than any other. It is self-supporting and gives cover from view and partial cover from fire quicker than any other form The gabions are filled with earth after they are placed in the revetment and may be used in one, two, or three tiers The gabion is usually woven with small brush cut in the vicinity Three men should make a gabion in an hour See FORTIFICATION

GABIROL, ga′bē-rōl′, SALOMON BEN See AVICEBRON

GABL, ga′b'l, ALOYS (1845–93) An Austrian genre painter, born at Wiesen, Tirol He was a pupil at the Munich Academy of Schraudolph, Ramberg, and finally of Piloty His poverty, the result of a disease of the eye, drove him to suicide at Munich His genre scenes closely resemble in characterization and humorous conception those of his famous countrymen Defregger and Matthias Schmid, but surpass them in striking light effects They include "Recruiting in Tyrol" (1873), "His Excellency as Umpire" (1876), "A Munich Tavern" (1880), "The Story-Teller," "Vaccination Room in Tyrol" (1885), the last in the New Pinakothek at Munich, and one of the choice specimens in that collection, and "Return of the Huntsman" (1892)

GA′BLE (OF, Fr *gable*, from OHG *gabala, gabal*, Ger *Gabel*, fork, AS *geafl*, fork, from Ir *gabul, gobul*, Welsh *gafl*, Bret *gavl, gaol*, fork) The triangular upper part of a wall which receives the end of a roof having two slopes or pitches meeting in a ridge at the top The form appears first in the pediments (q v) of Greek temples which, on account of their rich sculptures, became so important a part of temple architecture There was greater variety in the Roman than in the Greek gables, and when, after the fall of Rome, architecture began to develop in more northern countries, where the climate demands steeper roofs than in Italy, the gable assumed a new importance and received a wholly new treatment in the churches of the Romanesque style, especially in France The most notable change next to the steeper pitch was the complete suppression of the horizontal cornice of the classic pediment and with it of figure sculpture In time the gable began to be used as a termination for buttresses and an ornament of pinnacles, and in the Gothic styles, in which buttresses and pinnacles are so important, these decorative gables and *gablets* (as the lesser gables are called) became established ornament forms Gables were multiplied on tabernacle hoods, spire dormers, and shrines, and the openwork or traceried gable applied over windows and doors where it had no significance whatever except as pure ornament In the mediæval towns of northern and central Europe the gabled façades of houses on the street produce highly picturesque effects In the Gothic and Renaissance periods the simple outline of the gable in Belgium, Holland, and Germany became stepped and broken in the most fantastic manner, especially in Germany between 1550 and 1650 See CORBIE STEPS

Both in Roman and in Renaissance architecture the pediment form of gable occurs frequently as a decorative adornment over doors, windows, and niches, and this has become a recognized form of treatment for these features in modern architecture, but the term 'gable" is not commonly applied to them In New York the "gable walls" of houses built in a block are the party walls and side walls which receive the ends of the roof beams, though the roofs are nearly flat, this is a local usage

GABLENZ, ga′blĕnts, LUDWIG KARL WILHELM, BARON (1814–74) An Austrian general He was born at Jena, Saxe-Weimar, entered the Austrian service in 1833, and fought in Italy and Hungary in 1848 In the War of 1859 against Italy he took a distinguished part in the battles of Magenta and Solferino, commanded the Austrian army corps in the Austro-Prussian War against Denmark in 1864 at Trautenau, and won the only Austrian victory of the War of 1866 against Prussia After Sadowa he became a member of the Austrian Upper House, was appointed commanding general in Hungary in 1869, and retired in 1871 Financial difficulties drove him to suicide

GABLONZ, ga′blŏnts (Bohemian *Jablonec*) A busy manufacturing town of Bohemia, Austria, situated in a mountainous district about 1650 feet above sea level, on the Neisse, 7 miles east-southeast of Reichenberg (Map Austria-Hungary, D 1) It has a gymnasium, a professional school for braziers, and a trade school Gablonz is one of the centres of the Bohemian glass industry, which here employs more than 12,000 men Its specialties are glass beads, buttons, and imitation gems, and glass painting There are also manufactures of bronzes, cotton and woolen goods, celluloid ware, machinery, belts, and colored papers, and printing and bookbinding establishments The expert firms number over 100 Mineral baths are found in the vicinity Pop, 1900, 21,086, 1910, 29,605

GABOON, ga-bōōn′ See GABUN

GABORIAU, ga′bō′rē′ō′, EMILE (1835–73). A French novelist who conspicuously made crime

and its detection his subjects He was born at Saujon, Nov 9, 1835 His first popular writings were humorous sketches contributed to minor Parisian journals With little grasp of character or grace of style, with no true literary qualities indeed, he achieved a European reputation as a reviver of the romances of rascality, as an inaugurator of the detective story, and as the creator of the prototype of the modern Sherlock Holmes, M Lecoq, in connection with which he made a careful study of the Paris police system of his day. The best of his numerous volumes are *L'Affaire Lerouge* (1866), *Le dossier No 113* (1867), *Monsieur Lecoq* (1869), *La corde au cou* (1873), *La dégringolade* (1876). Consult M Topin, *Romanciers contemporains* (Paris, 1881)

GA'BRIEL (Heb, Man of God) In the Jewish angelology, one of the seven archangels. His function seems to be especially to reveal God's will and purposes He appears in the Book of Daniel as the interpreter of the prophet's vision regarding the ram and the he-goat (viii 16) and as bringing the explanation of the 70 weeks (ix 21) In the New Testament he announces to Zacharias the birth of John the Baptist (Luke i 19) and to Mary the birth of Christ (Luke i 26) In postbiblical Jewish literature Gabriel is frequently introduced The Targum to 2 Chron xxxii 21 says that Gabriel destroyed the host of Sennacherib. According to the Talmud it was he who showed Joseph the way to his brothers (Gen xxxvii 15–17), and he together with other angels buried the body of Moses (Deut xxxiv 6) He is the prince of fire, and the spirit who presides over the thunder and the ripening of fruits It was he that prevented Vashti from obeying the King (Esther i 12) and rewrote the record of Mordecai's service in the history after it had been erased Gabriel has also the reputation among the rabbis of being a most distinguished linguist, having, e g, taught Joseph the 70 languages spoken at Babel The Mohammedans also hold Gabriel in great reverence According to the claim of Mohammed in the Koran, it was he who revealed the sacred book He is called the spirit of truth and is regarded as the chief of the four most favored angels who form the council of God—a number corresponding to the system in the Book of Enoch (xl 9)

GABRIEL, Brothers of Saint (Institut des Frères de Saint-Gabriel) A religious congregation or brotherhood in the Roman Catholic church, founded in 1705 by Blessed Grignon de Montfort Its purpose is the Christian education of the young, the care of institutions for the deaf and blind and of orphan asylums The mother house of the community was originally at Saint-Laurent-sur-Sevre in La Vendée, but after the suppression of the teaching orders in France in 1905 it was transferred to Péruwelz in Belgium In 1906 the order conducted 170 schools or colleges, 8 asylums for the deaf and dumb, 4 for the blind, besides several homes for orphans The order was introduced into Canada by the Sulpician Fathers in 1888, and it conducts establishments in the dioceses of Montreal, Joliette, St Hyacinthe, Three Rivers, and also in Burlington, Vt. Number of professed brothers in America, 90, novices, 25 They take charge of 3 colleges, 1 asylum, and 15 elementary schools

GABRIELEÑO, ga'brē-ĕl-ā'nyō, or **SAN GABRIEL INDIANS** A Shoshonean (q v) tribe, formerly occupying all the southern half of Los Angeles Co, Cal, and under the influence of San Gabriel Mission There were but 11 survivors in 1910

GABRIEL HOUNDS A supernatural pack, which gives tongue at night, and thus gives warning of approaching sorrow A peculiarity of the phenomenon is that the cry always seems to come from the sky instead of from the earth The name is also applied to wild geese, whose noise when flying suggests that of hounds

GABRIELI, ga'brē-ā'lē, Andrea (c 1510–86) An Italian organist and composer, born in Venice He was a pupil in composition of Adrian Willaert and became second organist of St Mark's in 1566 In 1574 he wrote the music for the reception of Henry III of France, two cantatas for 8 and 12 voices, respectively, printed in 1587 He was famed for his choral works, masses, motets, and madrigals, and was the first to write a fugue, a form hitherto not attempted by the contrapuntists His best work is *Psalmi Davidici qui Pœnitentiales Nuncupantur* (1583) A number of his works were printed with those of his nephew Giovanni, such as some organ pieces, *Intonazioni d'organo* (1593, lib i) and *Ricercari per l'organo* (1595, lib ii and iii)

GABRIELI, Giovanni (1557–1612) An Italian composer, born in Venice He was the nephew and pupil of Andrea Gabrieli and became the first organist at St Mark's (1585) He was the greatest representative of the contrapuntal school of the sixteenth century and was considered the peer of Lasso and Palestrina, even surpassing the latter master in the richness of his tone color He was noted as a teacher and had many scholars from Germany, where his compositions were early known and appreciated He was one of the first to develop independent instrumental music in choral works The early editions of his works are rare, but single pieces are to be found in many of the sixteenth and seventeenth century collections of music His works are a *Benedictus* for 12 voices, *Psalmi Pœnitentiales 6 Vocum* (1583), *Madrigali a 6 voci o istromenti* (1585), *Madrigali e ricercari a 4 voci* (1587), *Ecclesiasticæ Cantiones 4–6 Vocum* (1589), *Sacræ Symphoniæ*, for 6–16 voices or instruments (1597), another book for 6–19 voices (1615), *Canzone e sonate a 3–32 voci* (1615) Consult Winterfeld, *Johann Gabrieli und sein Zeitalter* (Berlin, 1834)

GABRIEL'S INSURRECTION In American history, an insurrection of negro slaves in the vicinity of Richmond, Va, in August, 1800, organized by a young slave named Gabriel, for the purpose of murdering the whites The plot was discovered, Governor Monroe ordered out the militia, and many of the blacks were captured and executed

GABRILOVITCH, ga-brē'lō-vĭch, Ossip (1878–) A Russian pianist and conductor. He was born at St Petersburg and when still a child entered the conservatory there He became one of Rubinstein's favorite pupils and, after winning the Rubinstein prize in 1894, continued his studies with Leschetizky in Vienna Two years later he made his début at Berlin and thereafter gave concerts in Russia, England, Austria, Sweden, and the United States His first appearance in the United States was in 1900, and then, as upon his subsequent visits, he received an enthusiastic welcome. In

1909 he married Clara Clemens, the daughter of Mark Twain He is an exceedingly virile and sympathetic player

GABUN, or **GABOON,** ga-boōn′ A river, or more properly an estuary, on the west coast of French Equatorial Africa (q v), just north of the equator, about 40 miles long and about 10 miles wide (Map Congo Free State, A 2) It admits of the entrance of deep-draft vessels and formerly gave its name to the entire colony of French Equatorial Africa It receives the waters of the Como and some minor tributaries

GACHARD, ga′shar′, LOUIS PROSPER (1800–85) A Belgian archivist and historian. He was born in Paris, removed to Belgium in 1830, and became a Belgian subject in 1831 In the same year he was made keeper of the public records He was a member of the Belgian Academy, secretary of the Royal Historical Institution, and president of the Heraldic Bureau Gachard traveled extensively in search of documents bearing on Belgian history and published many authoritative works based on his researches. His principal writings are *Correspondance de Guillaume le Taciturne* (1847–58), *Correspondance de Philippe II sur les affaires des Pays-Bas* (1848–59), *Retraite et mort de Charles-Quint* (1854), *Relation des troubles de Gand sous Charles-Quint* (1856), *Don Carlos et Philippe II* (1867), *Actes des Etats-généraux des Pays-Bas* (1866), *Histoire politique et diplomatique de Pierre-Paul Rubens* (1877).

GAD According to the biblical account, a son of Jacob and his concubine Zilpah (Gen xxx 11), the eponymous ancestor of the tribe of Gad This tribe was promised land on the eastern side of the Jordan on condition that they should help the other tribes to conquer the territory west of the river (Num xxxii) This condition they fulfilled (Josh i. 12–18, iv 12) and then settled in their own territory (Josh xii 1–9) It may be concluded from this tradition that Gad was a warlike tribe (see 1 Chron xii 8) and secured its east-Jordanic settlement through conquest. The territories of the tribe are ill defined They lay between the settlements of Reuben on the south and those of Manasseh on the north, but there is a confusion in the biblical accounts, making it hard to determine the boundaries of the three tribes east of the Jordan There is no literature preserved which originated in this region. When the kingdom was divided in the days of Rehoboam, Gad joined Jeroboam and the northern kingdom (1 Kings xii 20) The tribe was taken captive to Assyria by Tiglath-pileser IV (734 B C) and is heard of no more The name "Gad," like that given to his brother Asher, may have been originally the designation of a deity of good fortune, worshiped in various parts of Palestine The fact that a Hebrew clan settled in the district which is embraced under the term "Gilead" in the broader sense is considered as pointing to the cult of this deity as the patron of the clan, whose connection with the other Hebrew tribes was never very close. The district contained, however, a number of ancient sanctuaries, such as Penuel and Succoth, which must at one time have been places to which pilgrimages were made See ASHER, GILEAD

GADAMES, ga-da′mēs, **GHADAMES,** or **RHADAMES,** ra-da′mēs. An oasis and town in the Italian Colony of Libya, North Africa, the centre of divergent routes to Tunis, Tripoli, Ghat, and Tidikelt, on the northern border of the Sahara, 310 miles southwest of Tripoli, and near the Algerian frontier (Map Africa, E 2). Gadames is an important entrepôt for manufactures and foreign goods from Tripoli to the interior and for exports of ivory, beeswax, hides, ostrich feathers, gold, etc, from the interior The oasis contains 63,000 date palms, the produce of which is a source of considerable wealth to the town Its gardens produce barley, wheat, millet, etc, and are watered by the hot spring (89° F) from which the town had its origin The climate is dry and healthful, though very hot in summer. A wall surrounds the oasis and town, and the streets are covered over for protection from the rain and sand storms Gadames has six mosques, seven schools, and two Roman Catholic churches Pop, about 7500

The town is the modern representative of the ancient city of Cydamus, a stronghold of the Garamantes, the capture of which by L Cornelius Balbus gave the Romans a great part of the wilderness. The town constitutes an ethnic menagerie The inhabitants, living in well-guarded inclosures, include Berbers, Arabs, the *Atriya*, or negro freedmen, and emancipated half-castes, each group speaking its own language and also Berber as a common medium of intercourse. They are called "born traders" Consult Keane, in Stanford's *Africa*, vol i (London, 1907), for list of explorers and political history

GAD′ARA The modern Umm Keis, or Mkes, once a prominent city of Palestine, now in ruins It was on the western extremity of a ridge of the Bashan plateau, 6½ miles east of the Jordan, and 6 miles southeast of the Sea of Galilee The site, 1194 feet above sea level, commands a magnificent view of the Jordan valley At the foot of the ridge, 3 miles to the north, flows the Sheriat el-Menadireh, the ancient Jarmuk, or Hieromax

Gadara is first mentioned in the history of the Greek period Josephus' statement that it was a Greek city implies that it was one of the many places in Palestine occupied by Greeks after Alexander's conquest (See DECAPOLIS, PALESTINE) Polybius states (v, 71, xvi, 39) that it was twice taken by Antiochus III of Syria, in 218 B C, and again in 198 B C, in his wars with Egypt for the possession of Palestine It remained nominally subject to Syria until about 100 B C, when with other Greek cities east of the Jordan it was taken, after a 10 months' siege, by the Jewish King, Alexander Jannæus, and partially destroyed When Pompey reduced Syria to a Roman province (65–63 B C), he rebuilt Gadara, as a favor to his freedman Demetrius, a Gadarene The restored city was thenceforward the fast friend of Rome On its coins it made use of the Pompeian era in commemoration of Pompey's kindness Augustus, after the battle of Actium, gave Gadara to Herod the Great, much against the wishes of its citizens For its loyalty to Rome it suffered greatly at the hands of the revolted Jews in the war of 66–70 A D At the request of its wealthy citizens Vespasian gave it a body of troops for protection against the Jews From notices in ecclesiastical history it appears that it continued to flourish until the Mohammedan conquest

The situation of Gadara was favorable for

commerce, and it was a prosperous city, called by Josephus the metropolis of Perea It was one of the important members of the Decapolis (q v) and a centre of Greek culture Meleager the poet, Theodorus the orator, Philodemus the Epicurean, Menippus the cynic, and others prominent in postclassical literature were Gadarenes Its ruins are extensive and magnificent It had two theatres, and the remains of the colonnade that once lined the main street are among the most remarkable in Palestine. Its water was supplied by an aqueduct from the Batanean hills, over 40 miles distant The ancient cemetery east of the city is noted for the construction of its tombs, each with several separate chambers with doors swinging on stone hinges The present inhabitants live in these tombs In Roman times the city was famous for its warm springs They are in the river valley, mainly on the north bank. About them quite a suburb grew up, Amatha by name, and extensive ruins of baths and other buildings of the once famous resort are now found there. The springs are still frequented by Bedouin, who consider the place neutral ground Probably Gadara has no connection with biblical history. See GERASENES, COUNTRY OF THE

GADDI, gad'dē A family of Florentine painters The founder was GADDO GADDI (c.1260–c 1333) He is supposed to have been associated with Cimabue and learned mosaic work from Andrea Tafi Modern authorities attribute to him the mosaics in the portico of Santa Maria Maggiore, Rome, illustrating the legend of the foundation of the church, which so closely resemble the frescoes on the ceiling nearest the portal in the Upper Church at Assisi that they are considered by Crowe and Cavalcaselle to be by the same hand Vasari attributes to him the mosaics of the "Coronation of the Virgin" over the door of the cathedral of Florence, the "Assumption" in the cathedral of Pisa, and part of the mosaics in the dome of the Florentine baptistery, but there is no further basis for these attributions —His son, TADDEO GADDI (c 1300–66), was a pupil of his godfather, Giotto, to whom, it is said, he was assistant for 24 years, and was preeminently the most talented of his followers, but merely developed Giotto's style, which he transmitted to his son and followers His work is inferior in character and expression to Giotto's, being superficial in content, though animated, often vehement, in action, and bright in color His masterpiece is the "History of the Virgin," in a series of frescoes in the Baroncelli Chapel at Santa Croce, Florence (1332–38) Signed altarpieces by him are at Berlin (1334) and in the Academy of Siena (1355), the latter painted originally for the sacristy of San Pietro at Megognano, near Poggibonsi The "History of Christ" and that of St Francis, formerly on the presses in the sacristy of Santa Croce, and now divided between the Florence Academy and the Berlin Gallery, and an altarpiece in the Naples Museum dated 1336, are attributed to him, as are also frescoes in the chapel of San Francesco, Pisa, and the "Last Supper" in the great refectory of Santa Croce In the Brooklyn Museum is a predella with scenes from the Life of St Laurence. As an architect he is reputed, mainly on Vasari's authority, to have continued Giotto's work on the Campanile at Florence and to have built the Ponte Vecchio. The frescoes of the Cappella degli Spagnuoli, in the cloisters of Santa Maria Novella, are also attributed to him by Vasari Many of his numerous works have perished — His son, AGNOLO GADDI (c 1333–96), who became, after his father's death, the pupil of Giovanni da Milano, continued the artistic traditions of the family. One of his best works was the series of frescoes on the "Legend of the Virgin's Girdle" in the cathedral of Prato, which illustrate the lighter, more picturesque and genre-like style which he affected, preparing the way for Masolino (q v) and other early Quatrocentists His ability as a decorator and composer is even better illustrated by the series of the "History of the Finding of the Cross" in the choir of Santa Croce at Florence, with numerous realistic details, which are further important as having inspired Piero della Francesca in his Arezzo frescoes. His figures are dignified, his color bright and clear, and the decorative effect is good, but the design is poor Consult Vasari, *Lives of the Most Eminent Painters, Sculptors, and Architects* (10 vols, New York, 1912), and Crowe and Cavalcaselle, *History of Painting in Italy*, vol 1 (London, 1903)

GADE, gä'de, NIELS WILHELM (1817–90). A distinguished Danish musician and composer, and the foremost representative of the Romanticists of the Scandinavian school of music He was born at Copenhagen, the only child of a cabinet and instrument maker, whose trade the son was required to adopt Within a few months, however, the boy abandoned it and made known his determination of becoming a musician A course of study under the leader of the court orchestra, Wexschall, and the practice and experience gained by his membership in the organization, enabled him at the age of 16 to make his début as a concert violinist He also studied theory under Berggreen, a well-known organist, and became a devoted student of the classics and a disciple of the new Romantic school of music In 1841 he won the prize offered by the Copenhagen Musical Association, submitting to the arbiters his first great composition, *Nachklange aus Ossian* Aided by the King, he was enabled in 1843 to go to Leipzig to complete his studies and in 1844 undertook, in the absence of Mendelssohn, the direction of the Gewandhaus concerts, becoming permanent conductor upon the latter's death in 1847. In 1850 he settled in Copenhagen, where he became organist, director of music, and master of the Chapel Royal He was elected one of the foreign members of the Berlin Academy of Arts in 1874, and in 1876 the Danish Folkething voted life pensions of 3000 crowns to the two most eminent musical composers, selecting Gade as one In addition to his prize compositions, he composed eight symphonies, five overtures, two suites, a quintet, an octet, and several vocal pieces, with orchestra, among them the well-known *Erl King's Daughter*, *The Springtide Phantasy*, *The Crusaders*, and many smaller compositions He died at Copenhagen Consult D Gade, *Niels W Gade* (Basel, 1894)

GADES, gā'dēz See CADIZ

GADFLY, or **HORSE FLY**. A fly of the family Tabanidæ, distinguished from other two-winged flies by having the last segment of the short antennæ ringed and not terminating in a bristle The proboscis is fleshy and envelops pointed horny processes by means of which

the skin is punctured The head is broad and short and the eyes are huge About 1500 species are named All are powerful fliers, and the females suck the blood of quadrupeds and man, although they, like the males, can also live on the sweets of plants As an extreme adaptation, the genus *Pangonia* of India and Nubia is remarkable, for the proboscis of the female is in some species three or four times as long as the body and is stiff and needle-like, so that it can easily pierce thick clothing The larvæ of the Tabanidæ are some of them aquatic, others live in the earth, others in decaying wood Like the adults, they are predacious, sucking the juices of insect larvæ, of worms, and of snails The pupa looks much like the chrysalis of a butterfly

The common representatives of the Tabanidæ may be uniform black, with a bluish tinge, as in the case of the large mourning horse fly (*Tabanus atratus*), or of medium size, with green heads or golden eyes, the latter are also known as deer flies To protect horses driven over infested roads—such as those passing through pine woods—netting should be used An application of fish oil and carbolic acid to points not easily reached by the tail is recommended Consult, in addition to works mentioned under FLY Osten-Sacken, "Prodrome of a Monograph of the Tabanidæ of the United States," in *Memoirs of the Boston Society of Natural History*, vol ii (Boston, 1875–78), Williston, "Notes and Descriptions of the North American Tabanidæ," in *Transactions of the Kansas Academy of Science*, vol x (Lawrence, 1888), id, *Manual of North American Diptera* (3d ed, New Haven, 1908)

GAD'IDÆ (Neo-Lat nom pl, from Neo-Lat *gadus*, cod, from Gk γάδος, *gados*, sort of fish). A family of soft-rayed fishes of north temperate and Arctic waters, including about 25 genera and 140 species Except one genus (*Lota*), all are marine, and among them are many of our most important food fishes, such as the common cod, pollack, haddock, etc See COD, FISHERIES

GADOLIN, ga'dō-lĕn, JOHAN (1760–1852). A Swedish chemist He was professor of chemistry at the University of Åbo, Finland His writings include *Einige Bemerkungen uber die Natur des Phlogiston* (1788) and *Systema Fossilium, Analysibus Chemicis Examinatorum* (1825) The mineral *gadolinite* was named after him

GAD'OLINITE (so called in honor of J Gadolin) An orthosilicate containing glucinum, iron, yttrium, besides varying amounts of didymium, lanthanum, and other oxides It crystallizes in the monoclinic system, and is dark green, brown, or black in color This mineral occurs chiefly in coarse pegmatitic veins associated with allanite It is found near Falun and Ytterby, Sweden, and also on the island of Hittero, Norway The principal locality in the United States is Bluffton, Llano Co, Tex. Special interest attaches to gadolinite, owing to the rare metals which it contains Velvety black, opaque gems have been cut from this mineral, but for collectors' use only.

GADOLIN'IUM A metallic chemical element, first detected by Marignac in 1880, but distinctly recognized as a new element and named gadolinium by Lecoq de Boisbaudran in 1889 In 1896 Demarçay devised a method for preparing gadolinium, or rather its oxide, in a state of considerable purity, and since then gadolinium has been recognized as a well-defined element In 1890 Lecoq de Boisbaudran showed that, while gadolinium gives no phosphorescence spectrum, it does give a beautiful spark spectrum Gadolinium (symbol, Gd, atomic weight, 157 3) forms an oxide of the formula Gd_2O_3, readily soluble in acids and absorbing carbon dioxide from the air Among the salts of gadolinium, all of which are colorless, deserve mention the chloride, $GdCl_3 6H_2O$, the sulphate, $Gd_2(SO_4)_3 8H_2O$, and the nitrate, $Gd(NO_3)_3 6H_2O$ or $Gd(NO_3)_3 5H_2O$

GADOW, ga'dō, HANS FRIEDRICH (1855–) A German-English naturalist, born in Pomerania. He studied at Berlin, Jena, and Heidelberg, in the last place under Gegenbaur From 1880 to 1882 he was in the Natural History Department of the British Museum, and after 1884 he served as Strickland curator and lecturer on zoology at Cambridge University, England He published *A Classification of Vertebrates* (1898), "Aves," in Bronn's *Classen und Ordnungen des Thierreichs, Amphibia and Reptiles* (1901), and *Through Southern Mexico* (1908), besides collaborating with Newton in his *Dictionary of Birds* (1893–96), and contributing extensively to the literature of investigation in zoology

GADSBYS, THE STORY OF THE A story by Rudyard Kipling, published in London in 1890.

GADS'DEN. A city and the county seat of Etowah Co, Ala, 56 miles by rail northeast of Birmingham, on the Coosa River, and on the Chattanooga Southern, the Louisville and Nashville, the Southern, and the Nashville, Chattanooga, and St Louis railroads (Map Alabama, C 2) It is in a productive timber and mineral region and has extensive trade interests, also a large steel mill, lumber mills, blast furnaces, foundries and machine shops, car works and maufactories of handles, sashes, doors, and blinds, flour, wagons, etc The city contains a marble post office and fine school buildings. Settled about 1845, Gadsden was incorporated in 1867. The government is administered by a mayor and a municipal council, elected on a general ticket The water works are owned by the city Pop, 1900, 4282, 1910, 10,557, 1914 (U S est), 13,326, 1920, 14,737.

GADSDEN, CHRISTOPHER (1724–1805). An American patriot, born in Charleston, S C He was sent to England by his father, a wealthy merchant, to be educated, and returned to Charleston in 1741 For some time he was employed in a counting house in Philadelphia, where later he embarked in a business of his own Returning to South Carolina, he was repeatedly a member of the provincial legislature, and in 1762 his election was declared void by Governor Boone—which turned him against the crown. In 1765 he was elected a delegate to the Intercolonial Convention held in New York City to protest against the Stamp Act He was a member of the first Continental Congress (1774–76) and urged an immediate attack on General Gage before he could be reenforced After the outbreak of the Revolution he became colonel of the First South Carolina Regiment, and took part in the campaigns in the South and in the defense of Charleston in 1776, being promoted brigadier general in the fall of that year In 1778 he was a member of the State Constitutional Convention of South Carolina;

and he quarreled and fought a duel (firing in the air) with Gen Robert Howe, commanding the patriot troops in South Carolina As Lieutenant Governor of the State, he signed the capitulation of Charleston when that city fell into the hands of Sir Henry Clinton, in May, 1780 He himself was released on parole, but a few weeks later was arrested by order of Lord Cornwallis and conveyed to Fort Augustine, where he remained a prisoner for 10 months, refusing to accept freedom on parole. He was finally exchanged, before the close of hostilities, in 1781 In 1782 he was elected Governor of South Carolina, but refused to accept the office, pleading that he was too old. In 1788 he was a member of the South Carolina Convention which ratified the Federal Constitution, and in 1790 of that which drafted the new State constitution Josiah Quincy hit him off well, calling him "plain, blunt, hot, and incorrect, though very sensible" He styled himself "Don Quixote Secundus" Consult Renick in *Publications of Southern History Association* (July, 1898), and McCrady, *South Carolina in the Revolution*, passim (New York, 1899–1902)

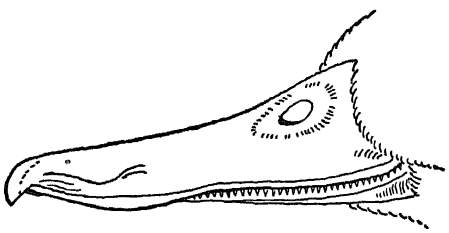
GADSDEN, JAMES (1788–1858) An American soldier and diplomatist, born in Charleston, S C He graduated at Yale in 1806 and entered the United States army soon afterward He served with marked efficiency in the War of 1812, was appointed aid-de-camp to General Jackson in 1818, participated in the Seminole War, was appointed military inspector of the Southern Division in 1820, and conducted the removal of the Seminole Indians to the southern part of Florida. In 1853–54 he was United States Minister to Mexico and in December, 1853, concluded the treaty which provided for the readjustment of the boundary between the two countries, and the acquisition by the United States of the tract of land subsequently known as the Gadsden Purchase (q v)

GADS'DEN PURCHASE, THE. A tract of land lying partly within the present New Mexico and partly within the present Arizona, purchased from Mexico by the United States in 1854 It embraces 45,535 square miles, is bounded on the north by the Gila River, on the east by the Rio Grande, and on the west by the Colorado, and has an extreme breadth from north to south of 120 miles For this the United States gave the sum of $10,000,000, while Mexico, besides making the cession, agreed (1) to the abrogation of the eleventh article of the Treaty of Guadalupe Hidalgo (q v), and (2) to the abandonment of all damage claims arising from Indian incursions between 1848 and 1853 The land was regarded as of little use for agricultural purposes and was purchased largely with a view to settling boundary disputes in that quarter between the two governments and to securing a desirable route for the projected Southern Pacific Railroad The treaty of sale was negotiated with Santa Anna by James Gadsden (q.v), then Minister to Mexico, in December, 1853, and, after undergoing modifications in the United States Senate, was finally ratified and proclaimed on June 30, 1854, Congress passing the necessary legislation on August 5 The sale met with much opposition in Mexico and caused the banishment of Santa Anna in 1855. For the text of the treaty, consult Haswell, *Treaties and Conventions* (Washington, 1889) See the map in the article UNITED STATES, EXTENSION OF THE TERRITORY OF THE

GADS'HILL A hill, 256 feet high, in the County of Kent, England, 2½ miles northwest of Rochester, on the London Road, celebrated by Chaucer, famous as the scene of Falstaff's encounter with Prince Henry, and noted as the home of Charles Dickens

GADSKI, gad'skē (TAUSCHER), JOHANNA (1871–) A German dramatic soprano, born at Anclam, Prussia She was educated at Stettin and made her operatic debut in Berlin in 1889 In 1895 she sang the principal Wagnerian rôles, alternating with Madame Klafsky, in Mr Damrosch's German company, and immediately won great success In 1898 she became a member of the Metropolitan Opera Company, New York, where she was thereafter one of the chief attractions She also sang at Covent Garden and Bayreuth In 1892 she married H. Tauscher, an officer in the Austrian army Her commanding presence, her beautiful and powerful voice, and her dramatic intensity make her one of the greatest interpreters of Wagner's heroines.

GAD'WALL (of doubtful etymology, hardly from *gad*, to run about + *wall*, as the variant spelling *gadwell*, influenced by popular etymology, implies), or GRAY DUCK A fresh-water duck (*Chaulelasmus streperus*), not quite so



BILL OF GADWALL

large as the mallard, nor often seen in the eastern United States, but common in the interior and in Florida It breeds from Kansas northward and during the summer is circumpolar in its distribution In the winter it migrates as far south as the Gulf of Mexico, southern Asia, and the north of Africa In color the gadwall is chiefly black and white, with some brown, buff, and chestnut This duck breeds in marshes and lays from seven to nine cream-white eggs Except at the breeding season, it is usually seen in small flocks, and an individual is sometimes to be found in a flock of other ducks It is a favorite game duck and highly esteemed for the table

GÆ'A (Lat, from Gk Γαῖα, *Gaia*), or GE The earth, honored among the Greeks as a goddess, though her personality is never very sharply defined The theogonies of the mythologists, though differing in details, represent her as the first-born of Chaos, and by Uranus (q v), the mother of the Titans (q v), Cyclopes (q v), and the hundred-handed monsters (See BRIAREUS) Angered at Uranus' treatment of his children, she helped Cronus mutilate his father When Cronus in his turn was deposed by Zeus, Gæa, angry at the fate of her children, the Titans, produced the Giants, who warred against the gods, after their overthrow she produced the monster Typhœus When he was conquered by Zeus, Gæa became reconciled to

the new dynasty In accordance with the varying points of view from which the earth was regarded, we find Gæa reverenced not merely as the universal mother, but as a goddess of death and the shades (within the earth was the abode of the dead), and as an oracular divinity, though Ægæ in Achæa, seems to have been the only place where an oracle of Gæa existed in historic times In art Gæa appears chiefly in connection with the birth of Erichthonius (see ERECHTHEUS) and the Gigantomachia, in both scenes she appears as rising out of the earth, only the upper part of the body being visible

GAEDERTZ, gĕd'ĕrts, KARL THEODOR (1855–1911) A German dialect poet and historian of literature He was born at Lubeck, and was educated at Leipzig and Berlin His extensive knowledge of cameralistics, law, philology, and Germanic literature secured him an appointment, in 1880, in the Royal Library in Berlin, and in 1903 he became chief librarian at Greifswald His publications include a number of valuable monographs on German poets, especially Fritz Reuter (q v), and on the history of the Low-German drama, among his best productions in this field being the following *Goethes Minchen* (1887), *Aus Fritz Reuters jungen und alten Tagen* (1897–1901), *Emanuel Geibel Ein deutsches Dichterleben* (1897), *Bismarck und Reuter* (1898), *Bei Goethe zu Gaste* (1900), *Silhouetten zu F Reuters Stromtid* (1903), *Im Reiche Reuters* (1905) His original productions in Plattdeutsch comprise a comedy, *Eine Komodie* (2d ed, 1881), and a collection of poems, *Julklapp! Leeder un Lauschen* (3d ed, 1899)

GAEKWAR See GAIKWAR

GAELIC (gā'lĭk) **LANGUAGE AND LITERATURE.** See BRETON LANGUAGE AND LITERATURE, CELTIC LANGUAGES, IRISH GAELIC LITERATURE, SCOTTISH GAELIC LITERATURE

GAELIC LEAGUE An organization devoted to the preservation, cultivation, and extension of the Gaelic language, particularly in Ireland From the time of the Statute of Kilkenny in 1367, when laws were enacted forbidding the use of the Irish language, dress, or surnames within the limits of the Pale, on penalty of death or confiscation, every effort had been made by the English government to crush out or discourage the native language, and on the establishment of the so-called national schools in 1833, the instruction in which was in the English language, the Gaelic language, even then spoken by a majority of the Irish peasantry, received its most decisive blow Through the efforts of the Society for the Preservation of the Irish Language, about 25 years ago, some partial concessions were obtained for the language in the schools, but with little practical result, owing to the indifference of the local authorities Matters were apparently at their lowest mark in all things national when, in 1893, the Gaelic League was organized, chiefly through the effort of Douglas Hyde (q v) and Father O'Growney (q v), the two most accomplished Gaelic scholars in Ireland An active educational campaign was at once begun throughout the country, resulting in the establishment of branches of the league in every important centre In 1898 the movement spread to America Gaelic is now taught in a large number of national schools and in nearly all the Catholic church parish schools in Ireland, the last report showing about 3500 students of Gaelic in Dublin alone Trinity College, Dublin, and the Roman Catholic Seminary of Maynooth maintain Gaelic chairs, and a revival in Gaelic literature has since developed, including a revival of Gaelic music and the drama In the United States and Canada there were in 1902 about 40 branches of the league, each of which conducted classes for the study of the language, besides rendering efficient help to the Irish organization Gaelic or Celtic chairs are also established at Harvard University, the Catholic University of America, Washington, and at Notre Dame University, Indiana. Substantial aid has been rendered by the Hibernian Order, which endowed the Washington chair, and has regularly contributed to the work in Ireland A similar movement has been inaugurated for Scotland and the Isle of Man by a Pan-Celtic organization which includes Wales, Brittany, and Cornwall in its scope of operations

GAETA, gä-ā'tä (ancient *Portus Caietae*) An episcopal city and seaport, and one of the strongest fortresses in Italy, in the Province of Caserta, on the Gulf of Gaeta, 74 miles by a winding railway northwest of Naples (Map Italy, D 4) To the northwest is the suburb of Elena The promontory of Gaeta, on which it is situated, looks from the distance like a tumulus and according to tradition was the tomb of Caieta, the nurse of Æneas (consult Vergil, *Æneid,* vii, 1 ff) hence the ancient name of the city, Portus Caietæ The promontory is crowned by the Torre d'Orlando, or tomb of Munatius Plancus, the friend of Augustus It is 160 feet in height and 160 feet in diameter and resembles the much smaller tomb of Cæcilia Metella at Rome The tomb is now used as a naval signal station and is inclosed within the modern fortifications On the rocks below is the town, in a beautiful setting of country houses and orange groves, while the Torre Angiovina in the citadel affords a splendid prospect of coast and sea Objects of interest are the campanile of the twelfth-century cathedral of St Erasmus, with a banner presented to Don John of Austria by Pope Pius V, and the remains of a Roman amphitheatre, a Roman theatre, and a column inscribed with the names of the 12 winds Along the coast, too, are many remains of Roman villas, some of which were built well out into the sea Gaeta is a centre of the coasting trade and markets fish, oil, wine, and fruit, it also manufactures rope It is the seat of an archbishop and has a seminary and a nautical institute It was originally a Greek colony and in ancient times had many magnificent public buildings Like Amalfi and Naples, it resisted the barbarian invaders and, becoming part of the Byzantine Empire—and later independent—was also a stronghold of civilization against the Lombards and the Saracens In 1134, however, it fell before Roger II and was annexed to the Norman Kingdom of Sicily During the centuries that followed it was under various masters In 1806 it was defended for six months against Massena by Prince Ludwig von Hessen-Philippsthal, who is buried in the citadel It was the refuge of Pius IX (q v) from 1848, when he fled from Rome, until 1850 From November, 1860, until Feb 13, 1861, Francis II of Naples, the last of the Bourbon kings, was besieged here by the forces of Victor Emmanuel under Garibaldi, and compelled to surrender Pop (commune), 1901 5528, 1911, 5344 Consult Merores, *Gaeta im fruhen Mittelalter* (Gotha, 1911).

GAETA, Duke of See Cialdini, E

GÆTU'LIA (Lat, from Gk. Γαιτουλία, *Gaitoulia*) In ancient times, the name given to a region in northern Africa lying south of Mauritania and Numidia and embracing the western part of the Desert of Sahara Its inhabitants belonged to the great aboriginal Berber family of north and northwestern Africa They were not in general black, though a portion of them dwelling in the extreme south towards the Niger had approximated to this color through intermixture with the natives and through climatic causes The Gætulians were savage and warlike, and skilled in the raising of horses They came into collision with the Romans for the first time during the Jugurthine War, when they served as light horse in the army of the Numidian King. Cornelius Cossus Lentulus led a force against them and for his success received a triumph and the surname of Gætulicus (6 A D). Later Gætulians served as auxiliary troops of the Romans. They have been identified with the Tuaregs, the Gutzula of southern Morocco, the Godola of the coast, the Ghedala of northwestern Sudan, and the Gæshtulas in Algeria

GAFF (from OF. *gaffe*, hook, from Ir *gaf*, hook) A spar, to which the head, or upper edge, of a fore and aft sail is bent The end next the mast is called the *jaws*, to form them two pieces of wood are bolted to the end of the gaff and the forward side of them cut out in the form of a semicircle so as to fit against the mast, to which it is held by a rope extending around it from jaw to jaw The after end of the gaff is called the *peak*, because it usually stands much higher than the jaws when the sail is set On board sloops and schooners gaffs are hoisted and lowered by ropes called *halyards*—those near the peak being the *peak halyards*, and those at the *throat*, near the jaws, being the *throat halyards* In square-rigged ships the *spanker* and *trysails* are the only ones having gaffs. These gaffs do not ordinarily hoist or lower and instead of jaws have eyebolts holding the forward end to the mast or to a traveler working on a batten on the mast; the latter method is best, as it permits the gaff to be lowered when the sail is reefed In furling, these sails are drawn in to the mast and up to the gaff by ropes called brails.

GAFFAREL, ga'fa'rĕl', Paul (Louis Jacques) (1843–) A French historian, born at Moulins and educated at the Ecole Normale Supérieure He held the chair of history at Besançon and then that of history in the faculty of letters at Dijon and at Marseilles His contributions to colonial history are particularly valuable His more important works include. *Etude sur les rapports de l'Amérique et de l'ancien continent avant Christophe Colomb* (1869), *Histoire de la Floride française* (1875), *Histoire du Brésil français* (1878), *Les colonies françaises* (1880), *L'Algérie histoire, conquête et colonisation* (1882); *Les explorations françaises de 1870 à 1881* (1882), *Les campagnes de la première République* (1883), *La conquête de l'Algérie jusqu'à la prise de Constantine* (1887), *Les Français au delà des mers Les découvreurs français du XIVème au XVIème siècle, Côtes de Guinée, du Brésil et de l'Amérique du Nord* (1888), *Campagnes du Consulat et de l'Empire* (1888), *Campagnes du premier Empire* (1890), *Le Sénégal et le Soudan français* (1890), *Histoire de la découverte de l'Amérique* (2 vols, 1892), *La politique coloniale en France de 1789 à 1830* (1908)

GAFFKY, gaf'kē, Georg Theodor August (1850–) A German physician, born at Hanover and educated at Berlin In 1888 he was appointed professor of hygiene at the University of Geissen As a member of the Imperial Bureau of Sanitation, in 1883–84 he accompanied the expedition sent out, under the auspices of Robert Koch, the celebrated bacteriologist, to investigate the conditions attending the epidemics of cholera in Egypt and India In this capacity he was enabled to accumulate the valuable material embodied in the report subsequently published in three volumes in collaboration with Dr Koch (1887) He was adviser to the Hamburg municipality during the cholera epidemic of 1892 and in 1897 headed a royal commission to India to study the plague In 1904 he succeeded Koch as director of the Institute for Infectious Diseases at Berlin He published *Zur Aetiologie des Abdominaltyphus* (2 vols, 1884), *Die experimentelle Hygiene im Dienst der offentlichen Gesundheitspflege* (1895)

GAFF'NEY. A city and the county seat of Cherokee Co, S C, 115 miles north-northwest of Columbia, on the Southern Railway (Map South Carolina, C 1) It is in a cotton and grain growing region and has manufactories of vulcanized fibre, cotton goods, fertilizers, cottonseed oil, ice, and lime. Tin and monazite are mined in the vicinity Gaffney contains a female college, a Carnegie library, and public parks The water works and electric-light plant are owned by the city Pop, 1900, 3937, 1910, 4767

GAFF-TOPSAIL CAT. A sea catfish (*Felichthys felis*), common along the eastern coast of the United States and frequently ascending streams It reaches a length of 30 inches, is not valued as food, and takes its name from the shape of its large dorsal fin, frequently exposed above the surface See Plate of Catfish

GAFSA BUTTON. See Boil

GAG (corrupted from the Spanish name *aguají*) A large grouper (*Mycteroperca microlepis*), of a variable bluish color, of the South Atlantic and Gulf coast of the United States It frequents reefs and banks It is an important food fish See Grouper

GAGALI See Podocarpus.

GAGARIN, ga-ga'rēn A princely family of Russia. Some of its most prominent members were Matvei Petrovitch, Governor of Siberia, who suffered death in 1721 by order of Peter the Great on suspicion of aspiring to an independent sovereignty Alexander Ivanovitch (died 1857) was a distinguished soldier of the Crimean War and was assassinated by the Prince of Suanethi, whose province he was about to annex to Russia Pavel Pavlovitch (1789–1872) was a member of the council of emancipation of the serfs and in 1864 and 1865 President of the Council of Ministers Ivan Sergeyevitch (1814–82) was Secretary to the Russian Embassy at Paris, turned Catholic in 1843, and became a Jesuit missionary He was the author of *Les starovières, l'église russe et le pape* (1857), *Les hymnes de l'église russe* (1868), etc

GAGE (Fr *gager*, from ML *vadium*, a pawn or pledge) An old term of English law, signifying a pledge or pawn of property as security for the performance of a legal obligation It is now found in our legal system only in the com-

bination mortgage (*mort gage*, dead pledge) Estates in gage were of two kinds—*vivum vadium* and *mortuum vadum*, the live pledge and the dead pledge *Vivum vadium* was where an estate in lands was given in security for a debt, on condition that the estate should remain with the lender until he had made good the sum lent out of the profits of the land *Mortuum vadum* was a pledge of land or goods to be held by the pledgee until the debt be paid or the obligation performed by the pledgor. See MORTGAGE, PLEDGE

GAGE, FRANCES DANA BARKER (1808–84) An American reformer and writer, the daughter of Col Joseph Barker She was born in Marietta, Ohio, married James L Gage, a lawyer, in 1829, and lectured on total abstinence, woman's rights, and slavery She removed to St Louis in 1853, and her activity there in the anti-slavery cause made her very unpopular Returning to Ohio, she devoted herself largely to editorial work During the Civil War she was an agent of the Sanitary Commission and had charge of a refuge for freedmen on Paris Island, S C Under the pen name of "Aunt Fanny" she became widely known as a writer of stories for the young

GAGE, LYMAN JUDSON (1836–1927) An American financier He was born in De Ruyter, Madison Co, N Y, and was educated at an academy at Rome, N Y, where in 1859 he became a clerk in a bank. In the following year he removed to Chicago, where, after working for three years in various capacities, he obtained a clerkship in the Merchants' Loan and Trust Company, of which in 1860 he became cashier In 1868 he left this position to become assistant cashier of the First National Bank, one of the leading banks in the West In 1882 he was promoted to the position of vice president and general manager and in 1891 became its president. In 1892 he first became a figure of national prominence from his election as president of the board of directors of the World's Columbian Exposition, the success of which was probably due more to him than to any other one man He had never taken an active part in politics nor held political office, although he had been a delegate to the Republican National Convention of 1880, and the chairman of its committee on finance, but he actively supported Cleveland in the campaign of 1884 In 1892 the Treasury portfolio was offered him by President Cleveland, but declined In 1897 he was appointed by President McKinley Secretary of the Treasury, which office he continued to hold in McKinley's second administration, and in that of President Roosevelt up to January, 1902, when he resigned and was succeeded by Leslie M Shaw. Elected president of the United States Trust Company, New York, in 1902, he continued in this office until his retirement from active life in 1906 Consult Handy, "Lyman J Gage A Character Sketch," in the *American Review of Reviews* (New York, 1897)

GAGE, SIMON HENRY (1851–) An American scientist He was born in Maryland, Otsego Co, N Y, and graduated in 1877 at Cornell University, where he taught until 1908, after 1896 as professor of histology and embryology. In addition to many contributions to scientific periodicals, his publications include *The Microscope and Histology* (1881, 11th ed, 1911), *Anatomical Technology* (with Professor Wilder, 1882), the vocabulary and definitions in animal histology for Foster's *Encyclopædic Medical Dictionary*, and several articles for Wood's *Reference Handbook on the Medical Sciences*

GAGE, THOMAS (1721–87) An English soldier and Colonial governor (military) of Massachusetts, born at Firle, Sussex, son of the first Viscount Gage He received a lieutenant's commission in the English army in 1741, participated in the battle of Culloden, served as aid-de-camp to Lord Albemarle in Flanders, and in 1751 became lieutenant colonel of the Forty-fourth Foot, with which in 1754 he came to America under General Braddock In the latter part of the march against Fort Duquesne he commanded the advance guard of Braddock's army He was stationed for a time at Oswego, raised a regiment of provincial troops in 1758, and commanded it on Abercromby's disastrous expedition against Ticonderoga, and in 1759, after the death of Colonel Prideaux, was sent as brigadier general to replace Sir William Johnson at Niagara He then served in the last campaign under General Amherst, who made him Governor of Montreal in 1760, was promoted to be major general in 1761, and was commander in chief of the English forces in America from 1763 to 1772, when he returned to England In 1765 in New York he was called upon by Governor Colden to enforce the Stamp Act (q v), but refused on the ground that a fire from the fort would be "the commencement of a civil war" In 1768 he was ordered to Boston to assist the civil magistrates and revenue officers there in carrying out the measures of the British Ministry, but could not get permanent quarters or supplies for his men in accordance with the Billeting Act Early in 1774 he succeeded Hutchinson as Governor of Massachusetts, and again became commander in chief of the British army in America He was warmly welcomed on his arrival in Boston in May, but soon antagonized the popular party by his enforcement of the ministerial measures, especially of the Boston Port Bill (q v) and the regulation acts On June 30, 1774, he issued a proclamation against the "solemn league and covenant"—to purchase no articles imported from Great Britain On September 1 he seized the powder stored at Cambridge and soon afterward began to fortify Boston On the night of April 18, 1775, he sent an expedition to Concord to destroy the provincial stores there and to capture Samuel Adams and John Hancock This led to the battle of Lexington (q v) He ordered the assault upon Bunker (Breed's) Hill on June 17, and as soon as the news of the action reached England was recalled, sailing from Boston on Oct 10, 1775 In April, 1782, he was promoted to the rank of general Some of Gage's papers are in vol xxxiv, *Collections*, Massachusetts Historical Society

GAGER, C(HARLES) STUART (1872–) An American botanist, born at Norwich, N Y He graduated from Syracuse University in 1895 and also studied at the New York State Normal School, Harvard Summer School, and Cornell University (Ph D, 1902) He served as vice principal of Ives Seminary (Antwerp, N Y), professor of biological science and physiography at the New York State Normal College (1897–1905), director of the laboratories of the New York Botanical Garden (1906–08), professor of botany at the University of Missouri (1908–10), and director of the Brooklyn Botanical Garden after 1910 He also taught in

Rutgers College, Morris High School, New York, and the Cornell Summer School He is author of *Errors in Science Teaching* (1901), *Effects of the Rays of Radium on Plants* (1908), *Non-Technical Lectures* (1913), and translated from the German of De Vries *Intracellular Pangenesis* (1910)

GAGERN, gä'gĕrn, HANS CHRISTOPH ERNST, BARON VON (1766–1852) A German statesman, born at Kleinniedesheim, near Worms, and educated at the universities of Leipzig and Gottingen He became a member of the Imperial Diet in 1791 and later represented the Prince of Nassau-Weilburg at Paris until 1811 After attempting to stir up an insurrection against Napoleon in the Tirol, he joined the Prussian army and became a member of the administrative board of North Germany in 1813 Later he served as Prime Minister of the King of the Netherlands and represented him at the Congress of Vienna in 1815 In 1816–18 he represented Luxemburg in the German Diet, but retired in 1820 His writings include *Die Nationalgeschichte der Deutschen* (2 vols, 1813–26; 2d ed, 1825–26), an autobiography, *Mein Anteil an der Politik* (vols i–iv, Stuttgart, 1822–26, vols v, vi, Leipzig, 1845), *Kritik des Volkerrechts mit praktischer Anwendung auf unsere Zeit* (1840)

GAGERN, HEINRICH WILHELM AUGUST, BARON VON (1799–1880) A German statesman. He was the second son of the well-known politician Hans Christoph Ernst Gagern (1766–1852) and was born at Bayreuth, Aug 20, 1799 He was educated at the military school of Munich (1812–14) and on Napoleon's return from Elba entered the army of Nassau, serving as lieutenant at Waterloo He afterward devoted himself to the study of law at the universities of Heidelberg, Gottingen, Jena, and Geneva While at Heidelberg, he aided in founding the liberal society of the Burschenschaft (q v) On returning home in 1821 he entered political life and served as Minister of the Interior and Justice in the Grand Duchy of Hesse. He was elected a member of the Lower Chamber in 1832, in which position he vigorously opposed the reactionary policy of the state governments and of the federal Diet In 1836 he retired to his father's estates, but reappeared 10 years later and helped bring on the revolutionary movement of 1848 in Germany In the National Assembly which met at Frankfort on May 18, 1848 (see VORPARLIAMENT), Gagern, as the recognized leader of those who favored unity and constitutionalism, was elected President and for a long time succeeded, by the force of his enthusiasm and his magnificent personality, in guiding the action of the Assembly In the strife over the question of admitting Austria as a Germanic power into the new Empire, Gagern sided with those who opposed Austrian pretensions, and on Dec 18, 1848, as head of the Imperial Ministry, submitted his "programme" to the Parliament providing for a federal state without Austria The King of Prussia was to be the hereditary ruler, but was to be restrained by a constitution. Though the plan was accepted by the Parliament, it failed on account of the lukewarmness of the Prussian King, to whom all looked as the head of the new state, and the general reaction which followed in Germany during the early days of 1849 (See FREDERICK WILLIAM IV) On May 20 Gagern withdrew from the Parliament, convinced that the cause of German unity for the time was a hopeless one He still took an active interest in politics, joining the party whose aim it was to bring about German unity under Prussian leadership, and in 1850–52 served as a major in the army of the duchies of Schleswig-Holstein (q v) On the conclusion of the struggle he retired to his estate at Monsheim, and only reappeared as the representative of the Grand Duchy of Hesse-Darmstadt at Vienna from 1864 to 1872 It seems that after 1859 he turned completely away from Prussia on account of her actions in the Italian War in that year He espoused the cause of Austria and had his children brought up in the Catholic church, although he himself had been a Protestant He was granted a pension in 1872 by Hesse and took up his residence at Darmstadt, where he died May 22, 1880 Besides several pamphlets and speeches, he was the author of a life of his brother, *Das Leben des Generals Friedrich von Gagern* (1856–57) His younger brother Maximilian was prominent in the service of the Duchy of Nassau and of Austria Consult Heimenz, *Heinrich von Gagern in seinen politischen Grundanschauungen* (Tubingen, 1899), Biedermann, *Deutsche Geschichte, 1815–79* (Breslau, 1883–89), Von Sybel, *The Founding of the German Empire*, translated (New York, 1890–98)

GAGNON, gan-yōn', CHARLES ALPHONSE NATHANAEL (1851–) A Canadian author He was born at Port Joli, Province of Quebec, and was educated at the public schools He engaged in journalism in Montreal, afterward in Quebec, where he became a reporter for the law courts, and finally obtained a position in the Provincial Department of Public Works He wrote a number of tales, sketches, and essays, including *Douleurs et joies* (1876), an historical novel, *Geneviève, St Jean, Port Joli* (1876), *Quelques considerations pour les temps actuels* (1882), *Les banques d'epargnes scolaires* (1887), *Etudes archæologiques et variétés* (1894), *L'Amérique précolombienne, essai sur l'origine de sa civilisation* (1908)

GAGNON, ERNEST (1834–1915) A Canadian musician and author He was born in Louiseville, Province of Quebec, and studied music first at home and at Joliette College, and subsequently in Europe He was organist of the parish church, St John's suburbs, Quebec, in 1853–64, and in 1857 was appointed professor of music in Laval Normal School He was organist at the Roman Catholic Basilica, Quebec, for 45 years (1864–1909). His career as organist and musical composer was varied by visits to Europe and by his position in the civil service For more than 30 years (1876–1907) he was Secretary of the Department of Agriculture and Public Works In 1863 he founded the Societé de Colonisation de Québec, and in 1869 the Académie de Musique de Quebec His musical compositions are chiefly of a religious character Among his writings are *Chansons populaires du Canada* (1865, 5th ed, 1908), *Le palais législatif de Québec* (1897), *Réponse à la brochure de Monsieur l'abbé H R Casgrain intitulée "Notes relatives aux inscriptions du monument de Champlain"* (1899), *Louis Joliet, découvreur du Mississippi et du pays des Illinois, premier seigneur de l'île d'Anticosti* (1902), *Choses d'autrefois, feuilles éparses* (1905), *Le fort et le château Saint-Louis, Québec* (1895, 3d ed, 1908). He also published.

Lettres de voyage, Au pays des ouananiches, Le drapeau de Carillon, and *Palmes d'or*

GAGNON, ga'nyôn', LUCIAN (?–1842). A Canadian political agitator, born at Pointe-à-la-Mule, Canada He was among the earliest to take part in the struggle by the French Canadians and their English sympathizers in Lower Canada for responsible government He was a member of the Assembly of the Confederate Counties at St Charles, Oct 23, 1837, and subsequently carried on a campaign of agitation against British rule He was instrumental in mustering a force of rebels, who were defeated at Moore's Corner and compelled to take refuge in the United States Another attempt at insurrection also proved unsuccessful, and Gagnon was arrested by United States troops on the charge of having violated the neutrality laws After the engagement at Odelltown, Nov 10, 1838, he gave up the struggle and settled in the United States

GAGNON, N D VILLE-. See VILLE-GAGNON

GAGNON, PHILEAS (1854–) A Canadian bibliographer and archivist He was born in Quebec and after receiving his early education there engaged in commercial life, which he relinquished for the study of Canadian bibliography An extensive and varied collection of Canadiana made by him, and said to be the best in existence, he sold in 1910 to the city of Montreal for a large sum He was appointed archivist for Quebec District, contributed frequently to the press on his favorite subject, and for some time was active in municipal life, having sat in the Quebec City Council and served as promayor In 1908 he was awarded a diploma of honor by the Royal Society of Canada for archæological studies In 1895 he published his well-known *Essai de bibliographie canadienne*

GAG RULES. In American history, the name applied to certain rules passed by the national Congress in disregard of the First Amendment to the Federal Constitution, for the abridgment of the right of petition with reference to the abolition or restriction of slavery After the beginning of the earnest agitation of the Northern Abolitionists against the institution of slavery about 1831, petitions of various kinds poured into the House and the Senate, praying for the abolition or the restriction of that institution These were generally presented by John Quincy Adams, who as a member of Congress identified himself particularly with the struggle against any congressional abridgment of the right of petition In May, 1835, the House passed the so-called Pinckney Resolutions, substantially renewed in January, 1837, which provided that all petitions relating to slavery should virtually be disregarded, should not be printed or referred, and should be laid on the table without action The resolutions also asserted that Congress should not interfere with slavery in the District of Columbia, and that that body had no power, according to the Constitution, to take action with regard to slavery in the individual States Adams's attempts to introduce petitions in disregard of these resolutions provoked animated debates, in which on some occasions considerable feeling was aroused between Northern and Southern members In December, 1837, the House passed the so-called Patton Resolutions, introduced by J. M Patton, of Virginia, which declared against the reading, referring, debating, or printing of any petition praying for the interference of the national government with the institution of slavery in any part of the United States, including the Territories and the District of Columbia In December of the following year the House passed the so-called Atherton Gag, covering much the same ground as the Patton Resolutions, and in January, 1840, passed the famous Twenty-first Rule to the same general effect Adams continued to offer petitions, however, and at the opening of each new Congress endeavored to have the objectionable rule omitted The majority against him progressively decreased, and in December, 1844, the rule was rescinded Consult Adams's *Memoirs* (12 vols, Philadelphia, 1874–77), Benton's *Abridgment of the Debates of Congress, 1789–1856* (16 vols, New York, 1857–61), id, *Thirty Years' View* (2 vols, ib, 1854–56), Wilson, *Rise and Fall of the Slave Power in America,* vol i (3 vols, Boston, 1872–77)

GAGUIN, ga'găn', ROBERT (c 1425–1501) A French chronicler and diplomat, born at Calonne-sur-la-Lys He studied at the University of Paris under Fichet and was made professor of canon law there (1463) and dean of the faculty Erasmus and Reuchlin were his pupils. He was intrusted with various diplomatic missions by Louis XI and Charles VIII, traveled in Germany, Italy, England, and Spain, and was court librarian for both these kings His chronicle went through many editions under the title *Compendium de Origine et Gestis Francorum a Pharamundo usque ad Annum 1491* (1495), and it was one of the sources of Fabyan's chronicle He left some letters and discourses, *Epistolæ et Orationes* (1498) Consult Gaquoin, *Denkschrift zum 400 Todestage des Robertus Gaguinus* (Heidelberg, 1901)

GA'HERIS The Orestes of Arthurian legend He was the son of Arthur's sister, Morganse

GAIDOZ, gâ'dôs', HENRI (1842–) A French Celtic scholar and anthropologist, born in Paris He became professor of geography and ethnography at the Ecole Libre des Sciences Politiques in 1872 and in 1876 professor of Celtic languages and literatures at the Ecole des Hautes Etudes He published *Esquisse de la religion des Gaulois* (1879–81), *La religion gauloise et le gui de chêne* (1881), *Les religions de la Grande Bretagne* (1885), *Le blason populaire de la France* (with Sébillot, 1884), *Etudes de la mythologie gauloise* (1886), *Les Roumains en Hongrie* (1894) He founded the *Revue Celtique* in 1870 and in 1877 with Eugène Rolland established *La Mélusine* for the study of folklore

GAIETY THEATRE, THE A London theatre situated on the Strand and opened in 1868 It is the original home in England of opera bouffe.

GAIKWAR, gī'kwar (Marathi, herdsman). The designation of the Mahratta ruler of Baroda (q v), one of the native states in India The Gaikwar originally was an officer in the establishment of the rajahs of Satara, who were nominally the supreme rulers of the Mahrattas (q v). The Gaikwar finally became hereditary second in command of the Mahratta armies Pilaji, who became Gaikwar in 1721, by predatory excursions gradually acquired authority over Gujarat, and his son, Damaji, who succeeded in 1732, still further extended the bounds of his ample dominions The latter threw off

his allegiance to the Peshwa, but, being taken prisoner by treachery, was compelled to yield one-half of his dominions and do homage for the other half Anand Rao, who ascended the throne in 1800, was the first prince of the line who had intercourse with the British The throne of the Gaikwar being contested by an illegitimate brother, Anand Rao secured the aid of the British government at Bombay and agreed by treaty, March 15, 1802, to receive a British subsidiary force Sayaji Rao, who became Gaikwar in 1819, was frequently on hostile terms with the British government, and in 1838 his deposition was contemplated In 1839 he made his submission and, among other concessions, abolished suttee His successor, Malhar Rao, inherited the family vices and in 1875 was deposed on account of his general misrule Sayaji Rao, of the Khandesh line, a boy of 13, was appointed his successor After attaining his majority the young Prince ruled admirably and brought his dominions to a high state of prosperity In 1906 he visited the United States He is honored with the hereditary title of Maharaja Gaikwar of Baroda

GAIL, gāl, JEAN BAPTISTE (1755–1829) A French Hellenist, born at Paris He became professor of Greek at the College de France in 1792 and keeper of the Greek manuscripts in the Royal Library at Paris in 1814 or 1815. With infinite industry he wrote numerous works, dealing especially with Lucian, Theocritus, Anacreon and the Greek anthology, Homer, Thucydides, and Herodotus Between 1814 and 1829 he edited *Le Philologue,* in 24 volumes, a collection of notes on Greek archæology, grammar, geography, etc Though of modest ability, he did much to rescue Greek from neglect For his many writings, consult Quérard, *La France litteraire* (Paris, 1829) See next article

GAIL, JEAN FRANÇOIS (1795–1845). A French Hellenist, son of Jean Baptiste Gail (1755–1829). He was born in Paris, and in 1829 became a professor at the Military Academy of Saint-Cyr His chief works were *Recherches sur la nature du culte de Bacchus en Grèce* (1821); and the *Geographi Græci Minores* (1826–31), containing, besides other extracts, the *Periplus* of Hanno, that of Scylax, and fragments of Scymnos

GAIL HAM'ILTON See DODGE, MARY A

GAILLARD, ga'yár', (CLAUDE) FERDINAND (1834–87) A French engraver, one of the most prominent of the nineteenth century He was born in Paris, studied under Léon Cogniet, and won the Prix de Rome for engraving in 1856 On his return from Rome he studied also under Sellier Much of his best work was done for the *Gazette des Beaux-Arts,* and he particularly excelled in interpreting the early Renaissance masters. His power was first revealed in the plate of the "Condottiere," after Antonello da Messina (1865) Among his other celebrated plates are "Gattemelata," after Donatello's statue, "Œdipus," after Ingres, "The Man with the Pink," after Van Eyck, "Virgin and Child," after Botticelli, "St George," after Raphael, "Twilight," after Michelangelo's statue, "The Pilgrims of Emmaus," after Rembrandt He also engraved from his own designs portraits of the Count de Chambord, Pius IX, Leo XIII, Monseigneur Pie, Sœur Rosalie, and Dom Gueranger These especially show his particular faculty, an almost clairvoyant grasp of personality. His technical method, which was original and varied, consisted in first etching the plate, which was then finished with the burin Many of his proofs are preserved in the Cabinet des Estampes, Paris Consult Henri Beraldi, *Les graveurs du dix-neuvieme siècle,* vol vi (Paris, 1885–92)

GAIL'LARD, DAVID DU BOSE (1859–1913) An American soldier and engineer, born in Sumter Co, S C He graduated from the United States Military Academy in 1884, served on the International Boundary Commission of the United States and Mexico (1891–94), had charge of the Washington Aqueduct (1895–98), was colonel of United States Volunteer engineers during the Spanish-American War, and subsequently (1909) was promoted lieutenant colonel in the regular army After 1898 he served on various stations until 1907, when he became a member of the Isthmian Canal Commission and director of the Panama Railroad Company, he took charge of dredging harbors and building breakwaters in the same year, and on July 1, 1908, became engineer of the central division of the canal from Gatun to Pedro Miguel He published *Wave Action in Relation to Engineering Structures* (1904)

GAILLARD, EDWIN SAMUEL (1827–85) An American physician He was born in Charleston District, S C, graduated at the University of South Carolina in 1845, and at the State Medical College in 1854 During the Civil War he served in the Confederate army, holding various positions in the medical department He was professor of principles and practice of medicine in the Louisville Medical College (1869–78) He was editor, successively, of the *Richmond and Louisville Medical Journal,* the *American Medical Weekly,* and *Guillard's Medical Journal*

GAILLARD, ga'yar', GABRIEL HENRI (1726–1806) A French historian and academician He was born at Ostel, near Soissons, took up the study of law, but abandoned his legal pursuits for history, and published a large number of works, characterized more by elegance of style than by strict adherence to facts Among these are *Histoire de Marie de Bourgogne* (1757), *Histoire de Francois I* (1766–69), *Histoire de la rivalité de la France et de l'Angleterre* (1771–77), *Histoire de Charlemagne* (1782) Gaillard also wrote *Eloges* on Descartes, Corneille, Molière, Charles V, Henry IV, and his intimate friend, Malesherbes

GAILLARDET, ga'yar'dā', THÉODORE FRÉDÉRIC (1808–82) A French dramatist and author, born at Auxerre. He achieved notoriety through his duel with Alexandre Dumas, père, and his subsequent lawsuit over the rights to the play *La tour de Nesle,* which Dumas had placed upon the stage as his own (1832) He wrote two other dramas, *Struensée, ou le médecin de la reine* (1832), and *Georges, ou le criminel par amour* (1833), and also *Mémoires du chevalier d'Eon* (1836, revised, 1866) He founded in New York City (1827) the *Courrier des Etats-Unis,* which he directed until 1848

GAIL'OR, THOMAS FRANK (1856–) An American Protestant Episcopal bishop He was born at Jackson, Miss, and graduated from Racine (Wis) College in 1876 and from the General Theological Seminary (New York) in 1879 In 1879–82 he was rector of the Church of the Messiah at Pulaski, Tenn He served as professor of ecclesiastical history in 1882–90, chaplain in 1883–90, and vice chancellor in

1890–93 in the University of the South, where he became chancellor and president of the board of trustees in 1908 He was Coadjutor Bishop from 1893 to 1898, when he became Bishop of Tennessee His writings include *Manual of Devotion* (1887), *The Apostolical Succession* (1889), *Things New and Old* (1891), *The Puritan Reaction* (1897), *The Master's Word and Church's Act* (1899), *The Episcopal Church and Other Religious Communions* (1904), *The Fruitfulness of Sacrifice* (1907), *The Christian Church and Education* (1910)

GAINAS, gā'nas (died 401) A Visigoth, commander in chief of the Roman army He was an Arian and caused the downfall and execution of the eunuch Eutropius He used his position for treasonable purposes, which he cloaked successfully for some years At length he became openly hostile and attempted to seize Constantinople His attempt was foiled and his army of Goths destroyed He fled, but was captured by a chief of the Huns, called Uldin, who sent his head to Constantinople Consult Bury, *History of the Later Roman Empire*, vol i (London, 1889), and *Cambridge Mediæval History*, vol i (New York, 1911)

GAINE, gân A French term (*gaîne* = a sheath), adopted in English to supply the lack of any corresponding word to designate a sheath-like pilaster such as was often employed in the late Renaissance or baroque architecture of Europe and the Elizabethan and Jacobean in England. Derived from the classic terminus or boundary mark—a head upon a square post tapering downward—it was applied to gate-posts, to all sorts of minor architectural objects, and in Germany and England even to more important uses, in place of the regular classic pilaster forms, sometimes with a human head at the top, oftener with a pilaster cap of moldings

GAINES, Edmund Pendleton (1777–1849) An American soldier He was born in Culpeper Co, Va, but was early taken by his father to North Carolina He studied law for a time, but in 1799 entered the United States army as an ensign, and from 1801 to 1803 was employed in the making of a topographical survey from Nashville to Natchez for the location of a military road In 1802 he became a first lieutenant, and two years later military collector of customs for the district of Mobile, in which capacity he arrested Aaron Burr (q v) on Feb 19, 1807 In the War of 1812 he was a captain in the battle of the Thames, participated in the engagement at Chrystler's Field, was commander at Fort Erie (q v) in August, 1814, until wounded by the bursting of a shell, and for his gallantry at Fort Erie received a brevet of major general, the thanks of Congress, and a gold medal He gradually rose to the rank of brigadier general He was one of the commissioners appointed in 1816 to treat with the Creek Indians, was in command of the Southern Military District at the outbreak of the first Seminole War in 1817, was retained as brigadier general and placed in command of the Western District when the army was reduced in 1821, took an active part in the second Seminole War of 1837, being severely wounded at Ouithlacoochie, and at the outbreak of the Mexican War was in command of the Department of the Southwest, with headquarters at New Orleans, and was actively engaged in raising volunteers He was court martialed, but released without censure, for calling out militia at this time without authorization

GAINES, John P (1795–1857) An American soldier and legislator, Territorial Governor of Oregon He was born at Augusta, Va (now West Virginia), but when very young removed to Boone Co, Ky He served as a volunteer in the War of 1812, was a member for several years of the Kentucky Legislature, and in the Mexican War served first as a major of Kentucky volunteers and afterward as an aid to General Scott He was a Whig member of Congress in 1847–49 and from 1850 to 1853 was Governor of the Territory of Oregon, and came into serious conflict with the Territorial Legislature, notably over the location of the capital Consult H H Bancroft, *History of Oregon*, vol ii (San Francisco, 1888)

GAINES'S MILL, Battle of A battle fought on June 27, 1862, during the Civil War, between a Federal force of about 30,000 under Gen Fitz John Porter and a Confederate force of about 65,000 under General Lee, on the left or north bank of the Chickahominy River, 8 miles northeast of Richmond, Va It was the second of the famous Seven Days' Battles (q v) which marked the close of McClellan's Peninsular campaign On the 27th of June General Lee, having crossed the Chickahominy with the greater part of the Army of Northern Virginia, attacked Porter's position at 2 P M, the Confederate right, centre, and left being commanded by Longstreet, A. P. Hill, and Jackson respectively Porter, though inadequately reenforced by McClellan, offered a magnificent resistance and stubbornly held his position in face of repeated assaults until 7 P M, when his left centre at last gave way and compelled a re-formation at some distance to the rear of the whole line, under cover of two fresh brigades from the left wing, commanded by French and Meagher The main battle had been preceded by a sharp contest between the Confederate A P Hill, advancing from Mechanicsville, and the Ninth Massachusetts Volunteers at Gaines's Mill, slightly in advance of the main Federal position, and from this the whole battle takes its name During the night of the 27th Porter joined the left wing south of the Chickahominy, and McClellan, compelled to abandon his old base at White House on the Pamunkey River, hastily made arrangements to transfer his army to the James During the progress of the battle McClellan, with the left wing, numbering fully 55,000 men, had been held in check by 25,000 Confederates under Magruder and had been deceived into believing that a Confederate army, numbering over 100,000, lay between him and Richmond Had he known the real state of affairs, it seems probable that he could easily have overwhelmed Magruder and captured the city while Lee was occupied north of the river On the other hand, Porter's stubborn resistance gave Lee an erroneous impression of the Federal strength at this point The total Federal loss in the battle of Gaines's Mill was 6387 men, besides 22 guns, while the Confederate loss, though never accurately determined, was probably as much as 1000 more Two years later the battle of Cold Harbor (q v) was fought in this vicinity Consult. *Official Records*, vol xi (Washington, 1885), Johnson and Buel, *The Battles and Leaders of the Civil War*, vol ii (New York, 1887), Ropes, *The Story of the Civil War*, vol ii (ib, 1894–98), Webb, *The Peninsula* (ib., 1881), Nicolay and

Hay, *Abraham Lincoln A History*, vol v (New York, 1890), Alexander, *Military Memoirs of a Confederate* (ib, 1907), Steele, *American Campaigns* (Washington, 1909)

GAINES'VILLE A city and the county seat of Alachua Co, Fla, 70 miles southwest of Jacksonville, on the Seaboard Air Line, the Atlantic Coast Line, and the Tampa and Jacksonville systems (Map Florida, D 2) It is a popular winter resort and has the Florida State University and a public library In the vicinity are several points of natural interest, notably Alachua Sink, which alternately is prairie and lake, Warren's Cave, and the Devil's Mill Hopper Gainesville has important wholesale interests The principal industries are farming, stock raising, lumbering, and phosphate mining, and there are foundries, ginneries, gristmills, wagon works, planing mills, etc An electric-light plant is owned by the city Pop, 1900, 3633, 1910, 6183

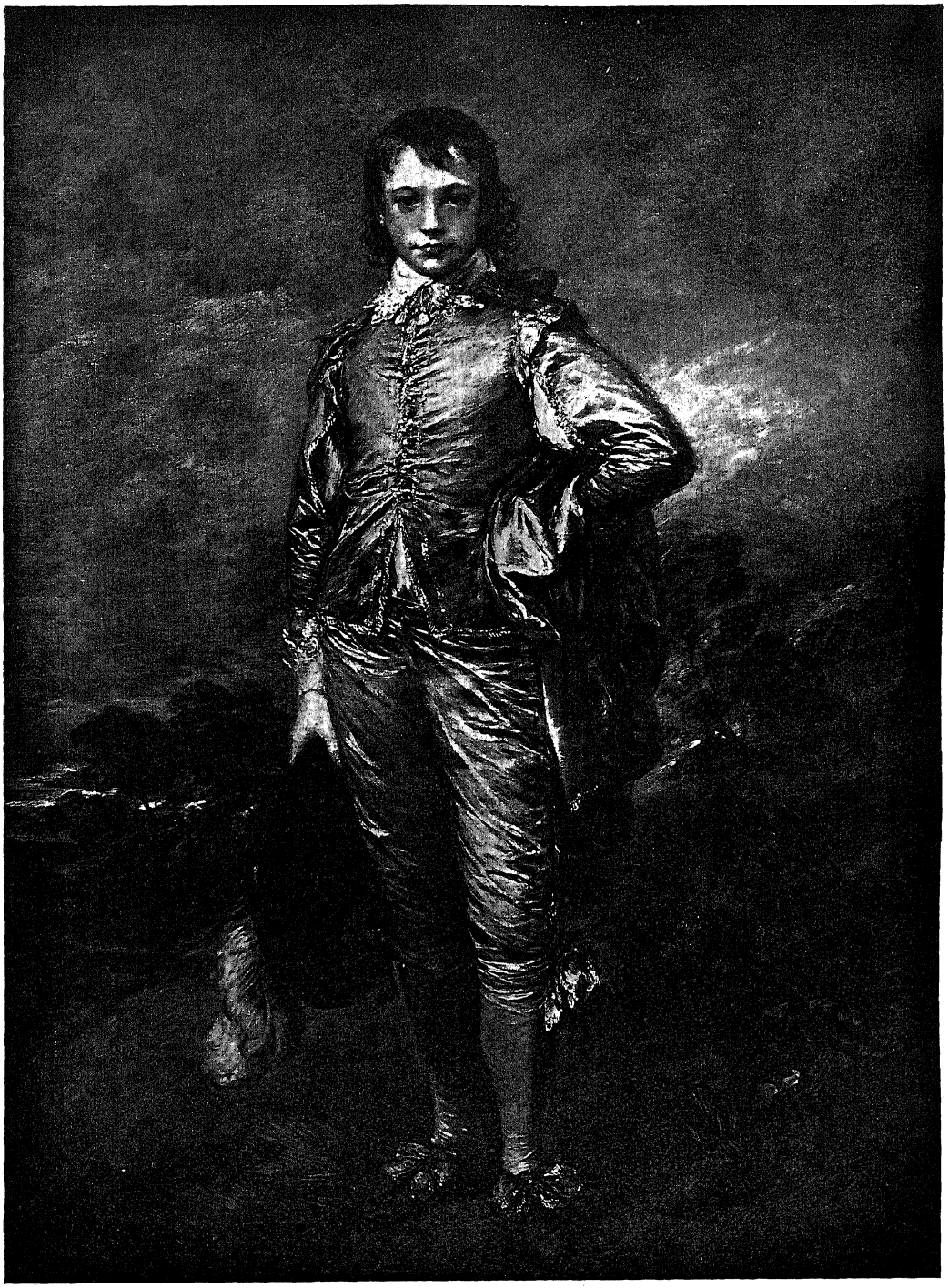
GAINESVILLE. A city and the county seat of Hall Co, Ga, 53 miles northeast of Atlanta, on the Southern, the Gainesville northwestern, and the Gainesville Midland railroads (Map Georgia, C 1) It is an attractive health resort, having several mineral springs, and is the seat of Brenau College and Conservatory of Music for young ladies, founded in 1878, and the Riverside Military Academy There is also a public park The manufactures include cotton goods, cotton yarns, asbestos, foundry and machine-shop products, cottonseed oil, buggies, wagons, brick, lime, tombstones, doors, sash, blinds, and meal Gainesville was first settled in 1821 and was first incorporated in 1870 It is governed, under a revised charter of 1885, by a mayor, elected every two years, and a council The city owns and operates the water works Gen. James Longstreet and Gov Allen D Candler lived and died in Gainesville Pop, 1900, 4382, 1910, 5925

GAINESVILLE A city and the county seat of Cooke Co, Tex, 65 miles north of Fort Worth, at the head of the Elm Fork of the Trinity River, and on the Gulf, Colorado, and Santa Fe, and the Missouri, Kansas, and Texas railroads (Map Texas, D 3) It is the centre of an agricultural and stock-raising district, and has an iron foundry and machine shops, and manufactures cottonseed oil, flour and foodstuffs, pressed brick, etc The city contains a fine post office and a city hall, Carnegie library, courthouse, city park, and fair grounds Gainesville was incorporated in 1873 and is governed, under a charter of 1879, by a mayor, chosen biennially, and a municipal council The water works are owned by the municipality. Pop, 1900, 7874, 1910, 7624

GAINS'BOROUGH An ancient market town and port on the right bank of the Trent, in Lincolnshire, England, 16 miles northwest of Lincoln (Map England, F 3) It is at the junction of the Great Northern, Great Eastern, and the Midland railways The town was constituted a port in 1841, the canals connecting with the Trent making Gainsborough the eastern outlet for the Midland counties It has important manufactures of linseed oil, ropes, malt, tobacco, and machinery There are also shipbuilding and iron works The town consists mainly of one long street running parallel with the river, which is spanned by a fine stone bridge The Old Hall, or Manor House, built about 1480 and restored in 1884, a baronial residence with a tower 75 feet high, is said to have been built by John of Gaunt and is now used as a corn exchange, public library, and a literary and scientific institute The John Robinson (1575–1625) Memorial Church, inaugurated in 1897, is dedicated to the pastor of the Pilgrim Fathers at Leyden, a reputed native of Gainsborough The town owns its water supply and maintains markets Pop, 1901, 17,660, 1911, 20,587 Consult Stark, *History of Gainsborough* (London, 1843)

GAINSBOROUGH, THOMAS (1727–88) One of the greatest English portrait painters, also a landscape painter of great importance He was born at Sudbury, Suffolk, the youngest of nine children His father was a woolen-crape maker, his mother an amateur flower painter, and the lad's bent to art was in every way encouraged He sketched proficiently at 10, and at 15 he was sent to London to study painting, he stayed with a goldsmith who introduced him to Gravelot, an engraver, from whom he gained his chief instruction The latter was a pupil of Watteau, whose influence may be seen in the dainty air of Gainsborough's figures, their small hands and feet, and the tufty foliage of his trees Later he was associated for some three years with Frank Hayman the historical painter After an unsuccessful attempt to establish a studio in London he returned to Sudbury in 1745 and continued his landscape studies Soon after his return he married Margaret Burr, a lady of great charm, whose placid influence was a source of great happiness in his life She was an illegitimate daughter of one of the exiled Stuarts or else of the Duke of Bedford, and her annuity of £200 placed the young couple above want Six months afterward he went to Ipswich, where for 14 years he lived quietly and worked earnestly In 1759 he sent 18 of his pictures to the exhibition of the Society of Arts, in 1760 he removed to Bath, remaining until 1774, when he returned to London In 1768 he was elected one of the original members of the Royal Academy His stay at Bath was marked by success, and he painted many portraits of fashionable beauties and the brightest spirits of the day George III, on hearing of Gainsborough's return to London, invited him to court and gave him orders for portraits of himself and Queen This seemed a signal for the fashionable world, which resulted in prosperity which lasted until Gainsborough's death. He died in London, Aug 2, 1788, and was buried at his request in Kew Churchyard, without name or inscription on the stone that marked his grave Gainsborough's landscapes are no less original than his portraits, and he has well been called the father of naturalistic landscape in England He treats by preference melancholy scenes, in faint or evening light—mysterious forest shades, or rough and broken country with clouded skies He rarely succeeded in selling a landscape, but, as he said, painted landscapes for love Characteristic examples are "The Watering Place," in the National Gallery, London, and a landscape of a fine, rolling green countryside, in the Metropolitan Museum, New York Especial mention should be made of his admirable drawings, which belong to the best produced by the British school His etchings also are worthy of mention

Gainsborough's portraits are distinguished for their noble and refined grace, they express al-



GAINSBOROUGH

"THE BLUE BOY," FROM THE ORIGINAL IN THE GROSVENOR GALLERY, LONDON

*

most invariably the moment of unconscious rest They interpret the winning personality of the individual rather than such intellectual qualities as those suggested by Reynolds Often faulty in drawing, the artist charms us by his color, which is cool, fresh, and transparent, the tones seem to follow each other like the chords of an instrument, without the slightest intimation of separation, fading away into a background of dreamy atmosphere His canvas was thinly painted with a smooth and swift technique

Of Gainsborough's 300 or more paintings, 220 are portraits, which are better represented in private than in the public collections of Great Britain Of his best works the National Gallery possesses "Orpen, the Parish Clerk," and "Mrs Siddons," a simple and dignified representation of the great actress, the Wallace collection, London, has "Perdita Robinson" and "Mrs Haverfield", the Royal Academy, a portrait of the artist, the National Gallery, Edinburgh, "Mrs Graham," one of his most refined and beautiful creations Among the finest in English private collections are "The Morning Walk" and "Mrs Sheridan," belonging to Lord Rothschild in London, "The Three Ladies," Mr Alfred Rothschild, London, and the "Blue Boy," in Grosvenor House Many of the best of Gainsborough's portraits have in recent years been bought by Americans Thus, Henry C Frick possesses "Honorable Annie Duncan", E H Huntingdon, "Viscount Ligonier," "Countess Ligonier," and 'Lady Petrie", and George J Gould, the musician "Abel"—all in New York In the J P Morgan collection (Metropolitan Museum, New York) are three fine examples "Lady Gideon," "Mrs Tennant," and "Georgiana, Duchess of Devonshire" The last-named picture, also called "The Stolen Duchess," attracted much attention by its theft from London and remarkable return by the thieves from Chicago because of their inability to dispose of so valuable a painting The Metropolitan Museum furthermore possesses four examples, the best of which (besides the landscape mentioned above) is a remarkable portrait of an unknown man, formerly thought to be Gainsborough himself

Bibliography. The best work on Gainsborough is Armstrong, *Gainsborough and his Place in English Art* (London, 1898), a model monograph, with scholarly, critical text and excellent illustrations Consult also the biographies by Colvin, in *Portfolio* (London, 1872), Brock-Arnold (ib, 1901), Gower (ib, 1903), Fletcher (New York, 1904), Pauli (Bielefeld, 1904), Boulton (London, 1905), Moier (Paris, n d)

GAIRD'NER, JAMES (1828–1912) An English historical writer and editor He was born and educated at Edinburgh and in 1846 was appointed a clerk in the Public Record Office As his peculiar adaptability for the work became evident, he was rapidly promoted, and he was made assistant keeper of the public records in 1859 He edited *Memorials of Henry VII* (Rolls Series, 1858), *Letters and Papers Illustrative of the Reigns of Richard III and Henry VII* (Rolls Series, 1861–63), *Historical Collections of a London Citizen* (Camden Society Publications, 1876), *Letters and Papers of Henry VIII* (Rolls Series, vols v to xv, in continuation of the work of Professor Brewer, 1880–96), *Three English Chronicles* (1880), *The Paston Letters* (Arber reprints, 3 vols, 1872–75, new ed, 1904) In addition to contributions to the *Dictionary of National Biography*, the *Cambridge Modern History*, and the *English Historical Review*, he published *The Houses of Lancaster and York* (1874), *Life and Reign of Richard III* (1878, revised, 1898), *Studies in English History*, with Spedding (1881), *Henry VII* (1889), *The English Church in the Sixteenth Century* (1902), and *Lollardy and the Reformation in England* (3 vols, 1908–11)

GAIRDNER, SIR WILLIAM TENNANT (1824–1907) An English physician, born and educated at Edinburgh From 1862 to 1900 he was professor of medicine at the University of Glasgow in 1863–72, also serving as chief medical officer of the city of Glasgow He took an active interest in securing reforms in municipal sanitation, and the enactment of the Glasgow Improvement Act in 1867 was due chiefly to his initiative His publications include *On the Pathology of Bronchitis, and the Diseases Connected with Bronchial Obstruction* (1850), *Clinical Medicine, Observations Recorded at the Bedside*, with Commentaries (1862), *On the Function of Articulate Speech, and its Connection with the Hand and the Bodily Organs* (1866), *The Physician as Naturalist* (1889), *The Three Things that Abide* (1903)

GAISERIC See GENSERIC

GAIS'FORD, THOMAS (1779–1855) A distinguished English classical scholar, born at Ilford After studying at Christ Church, Oxford, he was appointed regius professor of Greek at the university (1812) and dean of Christ Church (1831–55). From 1815 to 1847 he was rector of the parish of Westwell Besides his elaborate edition of the *Enchiridion* of Hephæstion (1810), with which he first won recognition as a critic, his valuable publications include an edition of the *Poetæ Græci Minores* (1814–20), of Stobæus (1822), of Herodotus (1824), of Sophocles (1826), of the lexicon of Suidas (Oxford, 1834), of the *Paræmiographi Græci* (1836), of the *Scriptores Latini Rei Metricæ* (1837), of the *Etymologicum Magnum* (1844), and of Eusebius (1842–52) Consult Sandys, *A History of Classical Scholarship*, vol iii (Cambridge, 1908)

GAISSIN, gī'sĭn The capital of a district in the Russian Government of Podolia, situated on the Sobi, a tributary of the Bug, 180 miles east of Kamenetz-Podolsk The chief occupation of the inhabitants is agriculture, the manufacturing industries of the town being insignificant Pop, 1897, 9393

GAÎTÉ, gā'tā', THÉÂTRE DE LA (Fr, Gaiety Theatre) One of the oldest theatres of Paris, originating in marionette shows instituted by Nicolet in 1753 A theatre was established in 1759 on the Boulevard du Temple, and in 1807, when the number of Paris theatres was restricted to eight by Napoleon, the Gaîté was among those retained, presenting vaudeville, drama, and spectacular pieces On the destruction of part of the boulevard in 1862, a new house was built in the Place des Arts et Métiers and is the present home of the theatre Among the many directors was Offenbach, under whom the operetta came into special prominence, but at the present time performances of all kinds are given Consult L H Lecomte, *Histoire des théâtres de Paris* (2 vols, Paris, 1905), and G Cain, *Les théâtres du Boulevard* (ib, 1906)

GA'IUS A Roman jurist of the age of the Antonines, and the chief source of our knowl-

edge of Roman law prior to Justinian His personal history is almost entirely unknown, and almost every subject connected with him a matter of controversy It is not known whether he was a Roman citizen, a foreigner, or a freedman As to the precise age of Gaius, this much is certain, that before the revision of the Roman laws and the reform of legal education by Justinian, the *Institutes* of Gaius, as well as four others of his treatises, were the received textbooks of the schools of law His *Institutes*, moreover, formed the groundwork of the *Institutes* of Justinian From his being thus preferred to Ulpian or Papinian, it is not to be inferred that he lived after them, but only that his work was more popular The latest jurist whom he cites is Salvius Julianus, who lived under Hadrian, and the latest Imperial edict is one of Antoninus Pius, whence it may fairly be concluded that he survived Antoninus and probably wrote under his successor

The works of Gaius were largely used in the compilation of the *Digest* of Justinian, which contains no fewer than 535 extracts from his writings The principal are The *Edictum Provinciale*, in 32 books, the *Aurea*, in seven, the *Edictum Urbicum*, *On Trusts*, *On Mortgages*, and, above all, the *Institutes*, in four books The last-named work is that by which Gaius is chiefly known, and it was probably the earliest complete and systematic textbook of Roman law Although it was the basis of Justinian's *Institutes*, both as to its matter and its division, yet it was completely superseded by that work and after a time was entirely lost, the only knowledge of it which remained being that which was gathered from the detached extracts in the *Digest*, and from the Breviary of Alaric (q v), or code of the Visigoths, which was known to be derived from it In 1816 Niebuhr, while on his way to Rome, discovered, in a palimpsest manuscript in the library of the Chapel of Verona, portions of the work of some ancient jurisconsult, which were soon afterward pronounced by Savigny to be a part of the *Institutes* of Gaius On the publication of his report the Berlin Academy of Sciences commissioned two German scholars, Goschen and Hollweg, in 1817, to make a copy of the entire palimpsest, which consists of 127 sheets Nine-tenths of the entire work was recovered, and was published in 1821 by Goschen, and again, after a fresh collation of the manuscript, by Blume in 1824. A third and much-improved edition by Lachmann appeared in 1842 A comparative edition of the *Institutes* of Gaius and Justinian, by Klenze and Bocking, appeared at Berlin in 1829.

The first book was translated into German in 1824 by Von Brockdorff, and the entire work has been translated into French three several times—by Baulet in 1826, by Domenget in 1843, and by Pellat in 1844 In England it has been translated, with notes, by Poste (4th ed, 1905), and by Abdy and Walker (1886), the latter work containing also the text and translation of Ulpian's *Fragments* Consult Huschke, "Zur Kritik und Interpretation von Gaius Institutionen," in his *Studien des romischen Rechts* (Breslau, 1830), also Mackeldey's *Handbook of the Roman Law*, translation (Philadelphia, 1883), Ortolan, *The History of the Roman Law*, translation (London, 1896), Savigny, *System des heutigen romischen Rechts* (Berlin, 1840–49), Stephenson, *History of Roman Law, with a Commentary on the Institutes of Gaius and Justinian* (Boston, 1912)

GAJ, gī, LJUDEVIT (1809–72) A Slavic writer and agitator, born at Krapina, Croatia, and educated at Vienna, Gratz, Leipzig, and Pest, where he came under the influence of Kollar (q v) In 1835 he founded the *Novine Hrvatske* (*Croatian News*)—a title afterward changed to *Ilirske Narodne Novine* (*Illyrian National News*), while a literary supplement was separately issued as *Danica Ilirska* (*The Illyrian Day-Star*) These rapidly became popular and were followed by similar publications and by the establishment of patriotic societies of every description The movement thus organized, which was largely instrumental in uniting the Croats and Serbs in their antagonism to the Magyars, excited considerable opposition in Hungary, and in 1843 the word "Illyrian" was prohibited Nevertheless, through the efforts of Gaj, a literary bond had been established among the southern Slavs of the Hungarian crown One of his patriotic songs, entitled "Još Hrvatska nij' propala" (Croatia is not yet lost), was extremely popular in its day He also reformed the Croatian orthography after the analogy of the Czech Consult the chapter on Gaj in Leger, *Serbes, Croates et Bulgares* (Paris, 1913)

GALABAT, ga'la-bat', or **KALABAT** A small district in the northwestern part of Abyssinia, adjoining Anglo-Egyptian Sudan Area, about 1540 square miles, pop, 20,000 It was formerly an Egyptian province and is settled by Tokiuris from Darfur Prior to the Italian-Abyssinian War it was in the Italian sphere of influence, but at present it forms an integral part of Abyssinia Metamneh (Matama), the chief town, is situated close to the Egyptian frontier and was commercially important prior to the Mahdi uprising in 1883 The population of the town is estimated at 8000

GALAC'TAGOGUE. A medicine that increases the lacteal secretion. The value of galactagogues in increasing the flow of milk from the breast is somewhat doubtful The only drug that approaches a true specific action is pilocarpus, and its action is very transient Antigalactagogues are drugs which have the opposite action Belladonna and potassium iodide are the most useful drugs given for this purpose

GALAC'TIC CIRCLE A great circle of the celestial sphere, passing approximately through the centre of the Galaxy, or Milky Way According to Herschel, the northern pole of this circle lies in the constellation Coma Berenices, its declination being + 27° and its right ascension 12 hours, 47 minutes See GALAXY

GALAC'TODEN'DRON (Neo-Lat, from Gk γάλα, *gala*, milk + δένδρον, *dendron*, tree), or COW TREE A tree of the family Urticaceæ, indigenous to tropical South America, variously called *Brosimum galactodendron*, *Galactodendron utile*, and by the common names *palo de vaca*, and *palo de leche* When tapped, it yields a milky juice which in its native countries is used in tea and coffee, turns sour on exposure to the air, and deposits a caseic substance It is closely related to the breadfruit (*Artocarpus incisa*), the breadnut (*Brosimum alicastrum*), and to the fig (*Ficus carica*)

GALAC'TOSE. See SUGARS

GALACZ, ga'lats See GALATZ

GALAGO, ga-lā'gō A genus of lemurs, locally known as Bush Babies, native to the

continent of Africa, where various species are scattered from Senegal (whence the name is said to have come) to Natal, none, however, being found in Madagascar, where other lemurs abound They vary in size from the bigness of a cat to that of a mouse and are some shade of gray or brown in color They differ from the other lemurs in dentition, and conspicuously in the power of folding lengthwise, and laying close to the head, their unusually large and naked ears, their tails are long and bushy, and their hind legs of great length proportionately, due to the elongation of the bones of the ankle and foot They are confined to forested regions, dwell in the trees, about which they leap with extraordinary agility, and where the smaller species are said to make nests resembling those of the mouse lemurs, but frequently go upon the ground, where their customary attitude is sitting upright on their haunches They feed upon insects, birds' eggs, fruit, etc, searching for these things mainly at night, and spending the day curled up asleep in some tree crotch or within the clustered fronds of a palm They thrive well in captivity and are active and interesting when wakeful The species longest known is that from Senegal (*Galago senegalensis*), one of the smaller ones, also found throughout equatorial Africa, a closely allied species (*Galago maholi*) ranges from the lower Zambezi to Natal The largest species are those of the west coast (*Galago crassicaudata* and *monteiri*), the least, Demidoff's galago, is only 5 inches long Consult Elliot, *A Review of the Primates* (New York, 1913)

GAL'AHAD, SIR The son of Launcelot and Elaine, and the purest knight of the Round Table, who alone was able to sit in the Siege Perilous and to recover the Holy Grail He saw and touched the Lord's body and died He is the hero of Walter Map's *Quest of the Holy Grail* Consult Morley, *English Writers*, vol iii (London, 1887–90) See GRAIL, THE HOLY

GA'LAM BUTTER TREE See BUTTER TREE

GAL'ANGALE (AS *gallengar*, from OF *galingal, garingal*, from *galange, galangue*, galangale, from ML *galanga*, from Ar *khalanjān, khōlinjān*, from Pers *khūlinjān, khavalinjān*, galangale, from Chin *Ko-liang-kiang*, mild ginger of Ko, or Kao-chow-fu, in the Province of Canton, from *Ko*, or *Kao*, name of a province + *liang*, mild + *kiang*, ginger), *Alpinia* A genus of plants embracing 30 or 40 species of the family Zingiberaceæ, with perennial stems, terminal inflorescence, succulent fruit, and rootstocks which when full-grown possess aromatic stimulating properties similar to those of ginger, for which it is much used in the East The pure galangale is the product of *Alpinia galanga* and *Alpinia officinarum*, natives of and cultivated in, the Eastern Archipelago It has a stem 6 or 7 feet high, broad leaves, and a branched panicle of greenish-white flowers The rootstock, when young, yields a kind of arrowroot and is used as an article of food The rootstocks of *Kæmpferia galanga* are used in a similar manner and the roots of a common British sedge, *Cyperus longus*, have similar properties

GALAN'THUS A genus of spring-blooming bulbs of the family Amaryllidaceæ, popularly known as snowdrops They are natives of Europe and western Asia, and about three species are known. The flowers, which appear often before the snow has melted, are normally solitary, pendulous, on scapes a few inches long, and with few exceptions white and green The leaves, which appear with the flowers, but develop more slowly, are grasslike, and last usually until midsummer Due to their easy culture, cheapness, extreme hardiness, and early blooming habit, snowdrops are general favorites The bulbs are planted a few inches deep in good soil, frequently on the borders of lawns, in midautumn, and allowed to shift for themselves, which they often do to the great satisfaction of the grower where conditions are specially congenial These conditions are partial shade, cool soil, and moisture

GALAOR, gāl'ā-ōr Son of Pelion, King of Gaul, and brother of Amadis of Gaul

GA'LAPA'GOS ISLANDS (*Sp pron* gā-la'pa-gōs), (Sp, tortoise) A group of small volcanic islands in the Pacific Ocean, crossed by the equator and extending from about long 89° to 92° W, about 600 miles west of Ecuador, to which it belongs (Map America, South, A 2) It consists of the larger islands of Albemarle, Indefatigable, Chatham, James, and Charles, and a number of smaller islands The total area of the group is estimated at 2870 square miles, of which Albemarle occupies over one-half The islands are volcanic in origin and mountainous. There are supposed to exist a number of more or less active volcanoes. The climate is less hot than is usual in regions of that latitude, owing to the cool Peruvian current, and the flora, though not rich, is interesting, including species peculiar to the group or even to separate islands Turtles are very numerous and form the chief product There is some sugar growing on the island of Chatham, and cattle are raised to some extent The population is about 400 The group was known in the sixteenth century and was frequently visited by buccaneers, to whom the islands are probably indebted for their English names They were annexed to Ecuador in 1832 and explored by Darwin in 1858 In 1911 proposals were made for the lease of the Galapagos as a manœuvre base for the United States navy, but the project caused popular tumult in Ecuador and was relinquished

The Galapagos Islands are of extreme interest to zoologists in view of the peculiarities of their fauna and the bearing the facts have upon the evolutionary history of animals It was the observation of them, during the voyage of the *Beagle*, which more than any other set of facts, perhaps, led Darwin to his subsequent speculations, and they figure largely in the reasonings of himself, Wallace, and all other evolutionists While in general the fauna resembles that of South America (see NEOTROPICAL REGION), it is remarkable for having almost no species in common with the continent, and a great paucity of all forms of life except birds The flora of the group is scanty, and more than half of its species are found nowhere else, so that it is natural to find that the land shells, insects (mainly beetles), etc, are few and peculiar Reptiles are represented by the famous giant tortoises, two species of snakes and four of lizards Of the last, two are of genera confined to the islands One is a large burrowing iguanid, and the other "an aquatic modification" of the same, living a semimarine life and subsisting on seaweeds The giant tortoises, now greatly decreased in numbers, were formerly extremely numerous and tame and reached a huge size

(See TORTOISE) The islands were named after them, and there were several species, each inhabiting a separate part of the archipelago The only mammals were a mouse and a rat, which there is much reason to believe escaped from some early ship and had time to become modified by the time they were discovered by naturalists Birds abound and present many interesting facts While their resemblance on the whole is to the avifauna of Central and South America, some extraordinary relationships to the Hawaiian fauna are apparent Forty-six genera, according to Ridgway (1896), are represented on the islands, 28 of which are water birds wandering throughout the American tropics One rail (*Nesofelia*) is peculiar, and a sandpiper is known elsewhere only in the Sandwich Islands Of the 13 genera of land birds, six are also represented in South and Central America, one (the bobolink) in North America, and four genera are peculiar, two of them are thrush-like birds, and two are ground sparrows These genera include a large number of species not known outside of the archipelago A striking feature in all branches of the local zoology is the specific disparity between animals peculiar to the different islands, each of which has its own kind The various facts lead to the belief that an immense period of time has elapsed since the islands were colonized, that this must have gone on very slowly and accidentally (except in the case of most birds), and at long intervals, and that to a great extent there has been no intercommunication of animal life between the various islands The archipelago is also a most fruitful illustration of insular influences on animal life and of the effects of isolation (q v) Consult Darwin, *A Naturalist's Voyage* (London, 1866), Wallace, *Geographical Distribution of Animals* (New York, 1876), Salvin, *Transactions of the Zoological Society*, vol ix (London, 1876), Ridgway, "Birds of the Galapagos," in *Proceedings of the United States National Museum*, vol xix (Washington, 1896), and its bibliography, Gifford, "Birds of the Galapagos," in *Proceedings California Academy of Sciences* (San Francisco, 1913).

GAL'APAS. A great giant, in Malory's *Morte d'Arthur*, with whom King Arthur fights

GALASHIELS, găl'a-shĕlz' A municipal burgh and manufacturing town in Selkirkshire, Scotland (Map Scotland, F 4) It extends for 2 miles along the Gala Water, near its confluence with the Tweed, 33 miles south-southeast of Edinburgh It has fine municipal buildings, a corn exchange, and a library It is the chief seat of the Scotch tweed, tartan, and leather manufactures, also produces dyestuffs, hosiery, iron and brass ware, and machinery The annual value of its products is over $5,000,000 The United States is represented by a consular agent In 1599 Galashiels was created a burgh of barony, and its woolen trade dates beyond 1778, when it possessed 30 looms and three "waulk" or fulling mills Pop, 1901, 13,598; 1911, 14,917 Consult Craig-Brown, *History of Selkirkshire* (Edinburgh, 1886), and Douglas, *History of the Border Counties* (ib, 1899)

GALATA, ga-la'ta A suburb of Constantinople (q v) The thirteenth region or ward of Byzantine times It was largely settled by Venetian and Genoese traders engaged in the trade of the Levant The descendants of these Italians constitute to-day the "Levantines" of Constantinople, many of whom dwell in Galata The commercial activity of the Turkish capital is centred largely in this suburb at present

GAL'ATE'A (Lat, from Gk Γαλάτεια, *Galateia*) 1 In Greek mythology, a Nereid, loved by Polyphemus She was surprised by the latter in a grotto with her preferred lover Acis, whom Polyphemus in a fit of jealousy crushed with a rock Acis was turned into a stream In other legends Galatea becomes by Polyphemus the mother of Galas The myth has been a favorite subject for poets and sculptors of ancient and modern times In English literature it is used in Gay's *Acis and Galatea*, Proctor's *Death of Acis*, Buchanan's *Polyphemus's Passion*, and Austin Dobson's *Tale of Polypheme* 2 A statue miraculously endowed with life by Venus at the prayer of the sculptor Pygmalion (q v) 3 In Vergil's *Third Eclogue*, a shepherdess who throws an apple to her lover, Damœtas, and flees to the shelter of the willows, taking care, however, to be seen, hence a type of the coquette

GALATEA 1 A pastoral, in prose form interspersed with lyrics, written by Cervantes in honor of his future wife, in 1583 2 A play (originally spelled *Gallathea*), produced before Queen Elizabeth at Greenwich, London, on Jan 1, 1582 The scene is laid in North Lincolnshire, but the piece is directly taken from Ovid's *Metamorphoses*, book ix

GALATEA The challenger in the races for the America's cup in 1886, when she was twice beaten by the *Mayflower* She was a steel cutter, built at Port Glasgow in 1885, from designs by Beavor-Webb Her length was 102 feet, with a displacement of 157 tons and a draft of 13½ feet

GALATEA, TRIUMPH OF A beautiful fresco in the Villa Farnesina at Rome, designed and executed by Raphael in 1514 It represents the sea nymph drawn in a shell by dolphins over a calm sea and accompanied by nereids and cupids. See RAPHAEL

GALATÉE, ga'la'tā' 1 A pastoral romance by Florian (1783), the most successful of his works It is drawn largely from a pastoral of Cervantes, which Florian supplemented with an additional book 2 A two-act comic opera, based on the story of Pygmalion and Galatea, with music by Massé and words by Carré and Barbier, presented at the Opéra Comique in 1852

GALATIA, ga-lā'shĭ-a (Lat, from Gk Γαλατία) The ancient name of a portion of Asia Minor, so called from the Gauls (Gk Γαλάται) who settled there Early in the third century B C Celtic armies appeared in the Balkan Peninsula, and, though driven from Greece by their defeat at Delphi, about 278 B C, continued to terrify Thrace (See BRENNUS, 2) About 277 B C the first bands entered Asia Minor on the invitation of Nicomedes, King of Bithynia, whose service they at first entered in his war with his brother. They were from three tribes —Tolistobogii, Tectosages, and Trocmi Of these, the first invaded Æolia and Ionia, in the neighborhood of Pessinus (q v), the Tectosages, the interior, about Ancyra (see ANGORA), and the Trocmi, the coast lands of the Hellespont, around Tavium Northern Phrygia and the border regions of Cappadocia were later conquered as a permanent home Each of the three tribes was divided into four tetrarchies, and the 12 tetrarchs formed the supreme government, with a council of 400 as advisers The Gauls did not settle in the cities, where the native population continued with but little

change, but, serving as mercenaries in the armies of the Greek kings of the East, made the neighboring territories pay tribute to escape their ravages A succession of defeats at the hands of Attalus I of Pergamum, about 235 B C, seems to have checked their incursions and to have confined them to their later boundaries between Bithynia and Paphlagonia on the north, Pontus on the east, Cappadocia and Lycaonia on the south, and Phrygia on the west Having sided with Antiochus against the Romans, the Galatians were severely punished by the consul Cn Manlius Vulso, 189 B C They sided with Pompeius against Mithridates, and the Romans gave one of the tetrarchs, Deiotarus, the title of King After the death of his successor, Amyntas, Augustus made the country a Roman province, divided under Theodosius into *Galatia prima*, with the capital Ancyra, and *Galatia secunda*, with the capital Pessinus The majority of the Gauls of Galatia retained their old Celtic language as late as the time of Jerome (fourth century), who says that they spoke the same dialect as the people about Treves, it is certain, however, that the ruling classes, like the original inhabitants, used Greek Galatia was twice visited by the Apostle Paul (Acts xvi 6, xviii 23) Just what part of the province was visited is not clear In the latter passage what is meant is evidently the Lycaonian part of the Roman province Galatia, in which were the cities Derbe, Lystra, and Iconium, and also, probably, the Pisidian part, in which Antioch belonged In xvi 6 the meaning is more uncertain, since we do not know just where the missionaries turned northward, but here also it is impossible that old Galatia proper is meant Probably the churches of Antioch in Pisidia, Iconium, Lystra, and Derbe, founded by Paul on his first missionary tour (Acts xiii–xiv), were among the churches to which the Epistle to the Galatians was addressed In so addressing his letter, Paul evidently had in mind the relation of his readers to the Empire, not their various ethnic affinities

Bibliography Droysen, *Geschichte des Hellenismus*, vol iii (Gotha, 1877), Van Gelder, *Galatarum Res in Græcia et Asia Gestæ* (Amsterdam, 1888), Stahelin, *Geschichte der kleinasiatischen Galater* (Basel, 1897), Holm, *History of Greece*, vol iv (London, 1898), Perrot, *Exploration archéologique de la Galatie et de la Bithynie* (Paris, 1863–72), Ramsay, *Historical Geography of Asia Minor* (London, 1890), Church, in *The Roman Empire* (ib, 1893), Mommsen, *Provinces of the Roman Empire* (New York, 1887), Humann und Puchstein, *Reisen in Kleinasien* (Berlin, 1893), Texier, *Asie Mineure* (Paris, 1835), Anderson and Crowfoot, *Journal of Hellenic Studies* (London, 1899), Ramsay, *Historical Commentary on St Paul's Epistle to the Galatians* (ib, 1899), the article "Galatia" in Pauly-Wissowa, *Real-Encyclopadie der classischen Altertumswissenschaft*, vol vii (Stuttgart, 1912)

GALATIANS, ga-lā'shanz, EPISTLE OF PAUL TO THE One of the four so-called *Hauptbriefe* (i e, most important epistles) of the Apostle Paul The introductory paragraph (i 1–10) is marked by unusual earnestness and self-assertion, indicating how intense was the Apostle's emotion when he wrote the letter The first main division (i 11–ii 21) is of a personal and apologetic nature, being a vigorous defense of the validity of his apostolic status and of the genuineness of the gospel he professed and preached The next main division (iii 1–v 12) is definitely doctrinal in character and unfolds the real significance of the gospel—salvation as being through *faith*, not works The Apostle here has in mind a different and contrary view of the gospel and his whole argument is framed to controvert the erroneous opinions to which the Galatians were in danger of yielding The third main section (v 13–vi 10) is of a practical nature, containing advice as to the true marks of the Christian life The conclusion (vi 11–17) is a serious reiteration of the main contention of the letter, penned apparently by Paul's own hand instead of being written by the amanuensis at Paul's dictation

The occasion of the letter is clearly revealed by its contents Paul's Galatian converts, who owed their Christian faith to his evangelistic work among them, and who had given themselves most heartily and unreservedly to the gospel he had preached and to him as a true Apostle of the Lord (cf iii 1–5 and iv 12–20), were being persuaded to accept a so-called gospel of an entirely different type, in which circumcision and legal observances took the place of faith in God's grace in Christ as the all-sufficient ground of salvation In other words, a Judaizing propaganda was being carried on in one of Paul's own missionary fields, a propaganda similar to that which made necessary the Apostolic Council of which we read in Acts xv, and also probably in this Epistle (chap ii 1–10), which took place c 49 A D That which disturbed Paul so profoundly was that these propagandists should have presumed to invade one of his own mission fields and seek to undo his work by insinuating (1) that he was no true Apostle and (2) that his gospel was no true gospel The issue thus raised was a vital one Paul saw clearly how much was at stake For if Christianity was only a mere appendage to Judaism, then its distinctive character was gone Paul championed the independence of Christianity and the Christian's *liberty* (v 1) in Christ and thus checked the Judaizing reaction which, had it been successful, would have put an end to the triumph of Christianity in the Gentile world

The "Churches of Galatia" to whom the letter is addressed may have been the churches founded by Paul and Barnabas on the first missionary journey (Acts xiii–xiv), i e, at Antioch of Pisidia, Iconium, Lystra, and Derbe, all of which were within the limits of the Roman Province of Galatia This view, the so-called South-Galatian theory, has had the strong support of many able scholars during the past few decades Among British scholars its foremost champion is Sir W M Ramsay, who has found a large following Its chief attraction is that through Acts xiii–xiv we are able to know something definite as to the origin and character of the churches addressed

The older view, the so-called North-Galatian theory, still held by a large number of very able scholars, holds that the churches addressed were in old Galatia proper and were founded by Paul on his second missionary journey, of which work we have an obscure hint in Acts xvi 6, also a hint of a second visit in Acts xviii 23, cf Gal iv 13 (where "the first time," Gk πρότερον, may have its literal meaning of "the former," i e, of two visits) The question is a complicated one, and the arguments in

favor of either one of the two theories are so nearly balanced by those in favor of the other that a final decision of the problem seems impossible The date of the Epistle is also a matter of dispute On the North-Galatian theory it must have been written after the visit of Acts xviii 23 and probably after his arrival at Ephesus (Acts xix 1), to which place he came not long after having visited the region of Galatia. How long it was, after leaving his churches in a satisfactory condition, before Paul received the surprising news that compelled him to write the letter, is nowhere indicated (in i 6 "so quickly," R V, refers simply to the suddenness of the change of opinion) The view that seems to have most in its favor is that the letter was written soon after Paul left Ephesus (Acts xx. 1 ff) while *en route* to Corinth Galatians, on this view, was written after 2 Corinthians, and not long before Romans, which in many respects enlarges and develops the argument of Galatians

On the South-Galatian theory, in case πρότερον (iv 13) means simply "formerly," many dates, including the one preferred above, are possible But if πρότερον is taken in its strict comparative sense, then the epistle cannot have been written later than some time between the second and third missionary journeys Many advocates of the South-Galatian theory consider it the earliest of Paul's extant letters

The literature on Galatians is very extensive and constantly increasing The older literature is fully listed in J B Lightfoot's great commentary (11th ed, 1892) The more recent literature will be found adequately presented in James Moffat's *Introduction to the Literature of the New Testament* (New York, 1911) A carefully balanced survey of the two rival theories will be found in *Encyclopædia Biblica*, art Galatia (4 vols, ib, 1899–1903) Consult also Zahn, *Introduction to the New Testament* (Edinburgh, 1909); Kirsopp Lake, *The Earlier Epistles of Paul* (London, 1911), the forthcoming commentary by E D Burton in the *International Critical Commentary*, and for exegesis the very suggestive study by Frederick B Westcott, *St Paul and Justification* (London, 1913)

GALATINA, gä'la-tē'na A city in the Province of Lecce, south Italy, 45 miles southeast of Brindisi, 14 miles south of Lecce The fine Gothic church of Santa Caterina, dating from 1384, contains the grave of Balzo Orsini, Count of Lecce, and frescoes by Francesco d'Arezzo (1435). Galatina markets leather, oil, wine, and cotton, and has a gymnasium and a technical school Pop (commune), 1901, 14,000, 1911, 15,400.

GALATZ, gä'lats, or **GALACZ** (Rum. *Galati*) A city of Rumania, in Moldavia, situated on the left bank of the Danube, between the mouths of the Pruth and the Sereth (Map Balkan Peninsula, F 2) It is divided into the old and the new town The latter is well built and is the seat of a bishop and of the European commission for the control of navigation on the Danube There are numerous extensive storehouses, grain elevators, a shipyard, and a large bazar Galatz is one of the leading ports on the Danube The imports, for the most part, consist of textiles and metal goods; the exports are mainly cereals, cattle, and lumber The annual shipping amounts to about 1,000,000 tons There are numerous foreign consular agents Pop, 1890, 59 143, 1899, 62,678, 1909, 66,000 Galatz figured prominently in the wars between Russia and Turkey. It was a free port previous to 1883

GALAUP, J F DE See LAPÉROUSE

GAL'AXY (from Lat *galaxias*, Gk γαλαξίας, *galaxias*, milky way, from γάλα, *gala*, milk), or MILKY WAY The luminous band, seen at night, which forms a zone encircling the sphere almost in a great circle This great zone has occupied the same position in the heavens since the earliest ages Its course, as traced by the naked eye, following the line of its greatest brightness, conforms nearly to that of a great circle, called the "galactic circle," which is inclined at an angle of about 62° 30′ to the equator, and cuts it in two points whose right ascensions are 6 h 47 m and 18 h 47 m, the former situated in Monoceros, the latter in Aquila In Centaurus it opens up into two branches—one faint and interrupted, the other bright and continuous—which unite again in Cygnus after remaining distinct for about 120° Throughout this space the galactic circle is intermediate to the two branches, lying nearer the brighter and more continuous left branch The Galaxy is wanting in regularity of outline Besides the two great branches into which it divides, it has many smaller ones which spring out from it One such branch runs out towards Scorpio and envelops the bright star Antares In Argo the undivided stream diffuses itself very broadly and opens out into a fanlike expanse of interlacing branches nearly 20° in breadth In the same region the branches terminate abruptly, and a wide gap presents itself in the zone, on the opposite side of which it recommences its course with a similar assemblage of branches At other points its course is irregular, patchy, and winding, while at more than one point, in the midst of its brightest parts, broad dark spaces occur One of these, known from early times among navigators as the "coal sack," is a singular pear-shaped vacancy about 8° long and 5° broad, occurring in the centre of a bright area overlying portions of the constellations of the Cross and Centaur The coal sack occupies about half the breadth of this bright space and presents only one star visible to the naked eye, though it contains many telescopic stars Its blackness, which attracts the most superficial observer, is thus due to the contrast with the brilliant ground by which it is surrounded Other dark spaces are to be found in Cygnus and Sagittarius The Galaxy was examined by Sir William Herschel with his powerful telescope and found to be composed mainly of stars, with patches of nebulosity which even the best modern instruments have been unable to resolve Modern photographic researches have added but little to Herschel's observations as to the structure of the Galaxy, but some of his conclusions concerning the form of the sidereal universe are no longer tenable See STAR

GAL'BA, SERVIUS SULPICIUS 1. A Roman general, notorious because, when prætor in Spain, in 151 B C, he murdered some Lusitanians, with their wives and children, after they had been induced to surrender to him by promises of grants of land In Cicero's opinion he was the foremost orator of his time 2 (5 B C–69 A D) Roman Emperor from June, 68 A D to Jan 15, 69 Born of a noble and wealthy family, he was raised to the consulship in 33, and, in the administration of the Province of

Aquitania under Tiberius, of Germany under Caligula, of Africa under Claudius, and of Hispania Tarraconensis under Nero, he distinguished himself for bravery, strictness, and justice His friends had urged him, on the death of Caligula, to take possession of the throne, but he continued faithful to Claudius and therefore stood high in his favor In 68 Julius Vindex rose with the Gallic legions against Nero and called on Galba to assume the Imperial dignity and thus rid the earth of its oppressor Galba, who had been informed that Nero was contriving his death, came forward against him at first as the legate of the Roman people, and it was only when he heard of Nero's death that he proceeded to Rome to take possession of the throne offered him by the Prætorians. Galba was now upward of 70 years old, and it soon appeared that his character had deteriorated, as, indeed, had already been manifested in his later administrations Indulgence to greedy favorites, ill-timed severity—above all, avarice, which led him to withhold the usual donatives to the troops—made him unpopular The legions in Upper Germany called on the Prætorians to choose another emperor, Galba thought to soothe them by adopting L Calpurnius Piso Frugi Licinianus as his coadjutor and successor, but he thus offended Otho (q v), who, as administrator of Lusitania, had supported Galba and looked to be rewarded The Prætorians, who had received no donative on the occasion of Piso's adoption, were easily excited to insurrection by Otho, and the Emperor, having gone out to quell the rebellion, was cut down by the soldiers as he crossed the Forum Consult the lives by Plutarch and Suetonius, and Henderson, *Civil War and Rebellion in the Roman Empire* (London, 1908)

GAL'BANUM (Lat., from Gk χαλβάνη, *chalbanē*, from Heb *khebenah*, galbanum, from *khālab*, to be fat). A soft, ductile, white gum resin used in medicine like asafœtida, principally in cases of chronic catarrh, and, especially by the Germans, in amenorrhœa and chronic rheumatism. Though sometimes applied externally in plasters as a mild stimulant in indolent swellings, it is generally administered in the form of the compound galbanum pill, which contains galbanum, sagapenum, asafœtida, myrrh, and soft soap It is brought from the Levant in tears or in large masses, which become yellowish with age, and which have a peculiar balsamic odor and an acrid, bitter taste Although it is mentioned in Ex xxx 34, the plant from which it is derived has not been definitely determined Since *Polylophium orientale, Ferula galbaniflua,* and *Ferula rubricaulis,* all of the family Umbelliferæ, have been supposed to be the source of galbanum, it is highly probable that it is the product of an umbelliferous plant But the confidence with which the species have been so represented has perhaps prevented travelers from making that inquiry into the subject which otherwise they might have made *Peucedanum galbanum,* a plant of this order found at the Cape of Good Hope, yields a gum resin very similar to galbanum See GUMS

GALBRAITH, gal'brāth, JOHN (1846-1914) A Canadian civil engineer and educator He was born in Montreal and was educated at Toronto University, where he graduated in 1868 at the head of his class After a course in engineering and surveying he was employed at various times as an engineer during the construction of the Intercolonial, Midland, and Canadian Pacific railways In 1880 he organized a journey of exploration from Georgian Bay to Fort Churchill on James Bay, and then easterly to Lake Mistassini Upon the opening in Toronto in 1878 of the School of Practical Science for Ontario, he was appointed professor of civil engineering therein, and in 1889 he became principal of the school Later he was also made dean of the faculty of applied science and engineering in Toronto University Galbraith was one of the founders of the Canadian Society of Civil Engineers, of which he was elected president in 1908 He was also elected an associate of the Institute of Civil Engineers, England, and vice president of the Canadian Institute, Toronto After the collapse in 1907 of the great Intercolonial Railway bridge across the St Lawrence River near Quebec, he was appointed a member of the Royal Commission to investigate and report thereon

GALCHAS, gal'chaz The designation of a number of tribes in the plateaus and valleys of the Pamir and Hindu Kush, in Ferghana, the basins of the Zerafshan, Amu Darya, etc, who physically belong to the white race and linguistically to the Aryan stock They are generally thickset, brachycephalic, and in some other respects resemble what Ripley (1899) calls "the ideal Alpine or Celtic European race"—a relationship recognized by Topinard in 1878, and since then by Ujfalvy, etc They are thus one of the farthest Aryan outliers in Central Asia In religion they profess, mostly, Islam of the Sunnite creed Since their residence in this region their physical characteristics have been somewhat modified by intermixture with other peoples of the environment The anthropology of the Galchas has been discussed by Ujfalvy in the *Revue d'Anthropologie* (Paris, 1879), Biddulph in *Tribes of the Hindu-Kush* (London, 1880), and the *Bulletins de la Société d'Anthropologie de Paris* for 1887, and more briefly by Ripley in his *Races of Europe* (New York, 1899) and by Keane in *Man Past and Present* (Cambridge, 1900)

GALDÓS, gal-dōs', BENITO PÉREZ- See PÉREZ-GALDÓS, BENITO

GALE (probably connected with Dan *gal,* Icel *galinn,* furious, from *gala,* to chant) A strong wind varying in velocity (according to the technical classification) from 40 to 65 miles per hour. Gales are described as moderate, fresh, and strong, or whole gales On sailing ships, ordinarily, very little sail is carried in strong gales; when they are very strong, only close-reefed topsails, staysail and spanker If running with the wind free, a close-reefed foresail may also be set In fresh or moderate gales more sail is carried See WIND, BEAUFORT SCALE

GALE, IN BOTANY See CANDLEBERRY.

GALE, HENRY GORDON (1874-) An American physicist He was born at Aurora, Ill, and graduated in 1896 from the University of Chicago (Ph D, 1899), where he taught physics after 1899, becoming associate professor in 1911 and dean in the Senior College in 1908 In 1906 he was physicist of the Solar Observatory, Mount Wilson, Cal, and in 1909-11 research associate in the Carnegie Institution's station at the same place Besides his articles on optics in scientific periodicals, he is coauthor with R A. Millikan of *A First Course in*

Physics (1906) and *A Laboratory Course in Physics* (1906), and with Walter S Adam of *An Investigation of the Spectra of Iron and Titanium under Moderate Pressures* (1912)

GALE, NORMAN ROWLAND (1862–) An English poet, born at Kew in Surrey, and educated at Exeter College, Oxford Between 1888 and 1891 he published privately at Rugby several verse pamphlets In 1892 appeared *A Country Muse*, which was followed later in the same year by a new series under the same title. These collections consist mainly of lyrics of love and nature He later published *Orchard Songs* (1893), *A June Pastoral* (1894), which is an idyl in mixed prose and verse, *Songs for Little People* (1896), *Barty's Star* (1903), *More Cricket Songs* (1905), *Song in September* (1912).

GALE, SAMUEL (1783–1865) A Canadian jurist He was born in St Augustine, Fla, and in his youth was taken by his father, an English officer, to Quebec, where he was educated He studied law and was called to the bar in 1808 Having been appointed a magistrate in the region then known as the Indian Territories, he went to the northwest in 1815 with the fifth Earl of Selkirk (q v) During the administration (1819–28) of the ninth Earl of Dalhousie as Governor-General of the British North American Provinces, widespread complaints were made in Lower Canada as to the arbitrary conduct of that official towards the politically disaffected in the province, and Gale went to England as a representative of the English-speaking inhabitants to defend Dalhousie's course In 1829 he was appointed chairman of quarter sessions, and in 1831–49 was a judge of the Court of Queen's Bench of Lower Canada. As a judge, he upheld martial law as enforced in the rebellion of 1837–38. Though strongly Conservative in his political views, he was an uncompromising enemy of slavery and eagerly supported the agitation in 1860 which was started to prevent the extradition of John Anderson, a runaway colored slave from Missouri He published in the Montreal *Herald*, over the signature of "Nerva," a series of papers decidedly Conservative in tone, they produced a deep impression He died in Montreal

GALE, THEOPHILUS (1628–78) An English Nonconformist divine. He was born at Kingsteignton, Devonshire, and was educated at Magdalen College, Oxford After preaching at Winchester Cathedral for five years, he was dismissed because of his Nonconformist views (1662) and devoted himself to teaching Shortly before his death he was appointed to the pastorate of an independent congregation in Holborn His fame rests chiefly upon *The Court of the Gentiles, or, A Discourse Touching the Original of Humane Literature from the Scriptures and Jewish Churches* (1669–78), in which he expresses the view that all theology, philology, and philosophy may be traced to Jewish sources

GALE, THOMAS (c 1635–1702) An English author He was born at Scruton, Yorkshire, and was educated at Westminster School and at Trinity College, Cambridge He was regius professor of Greek at Cambridge from 1666 to 1672, high master of St Paul's School in 1672–97, and afterward dean of York Widely celebrated for his scholarship, he published *Opuscula Mythologica, Ethica et Physica* (10 parts, 1671), *Historiæ Poeticæ Scriptores Antiqui* (1675), *Historiæ Britannicæ, Saxonicæ, Anglo-Danicæ Scriptores* (1691), *Rhetores Selecti Demetrius Phalereus, Tiberius Rhetor, Anonymus Sophista, Severus Alexandrinus, Græce et Latine* (1676)

GALE, ZONA (1874–) An American writer She was born at Portage, Wis, and in 1895 graduated from the University of Wisconsin (M L, 1899) Until 1901 she worked on the staffs of Milwaukee newspapers, and from 1901 to 1904 she was staff member of the New York *World* and wrote for other papers She is author of *Romance Island* (1906), *The Loves of Pelleas and Etarre* (1907, new ed, 1913), *Friendship Village* (1908), *Friendship Village Love Stories* (1909), *Mothers to Men* (1911), *Christmas* (1912), *When I Was a Little Girl* (1913)

GALEAZZO, ga'lā-at'sō, GIAN See VISCONTI

GA'LEN (Gk Γαληνός, *Galēnos*), or CLAUDIUS GALENUS (130–?201) A celebrated physician, born at Pergamus in Mysia He first studied medicine at Pergamus, afterward at Smyrna, Corinth, and Alexandria He returned to his native city in his twenty-ninth year and was at once appointed physician to the school of gladiators In his thirty-fourth year he went to Rome, where he stayed about four years, and was offered, but declined, the post of physician to the Emperor He returned to his native country in his thirty-eighth year, but soon received a summons from the emperors M Aurelius and L Verus to attend them on the northeastern frontiers of Italy, whither they had gone to make preparations for a war with the northern tribes He joined the camp towards the end of the year 169, but, a pestilence breaking out, the emperors and their court set off for Rome, whither Galen accompanied or followed them The place and date of his death are not known with certainty, but it is believed that he died in Sicily

The works that are still extant under the name of Galen consist of 83 treatises acknowledged to be genuine, 19 whose genuineness has been questioned, 45 undoubtedly spurious, 19 fragments, and 15 commentaries on different works of Hippocrates Besides these, he wrote a great number of works whose titles only are preserved, and altogether it is believed that the number of his distinct treatises cannot have been less than 500 We may divide his works into (1) those on anatomy and physiology, (2) those on dietetics and hygiene, (3) those on pathology, (4) those on diagnosis and semeiology, (5) those on pharmacy and materia medica, (6) those on therapeutics, including surgery, (7) his commentaries on Hippocrates, and (8) his philosophical and miscellaneous works We have most of these works in Greek, the language in which they were originally written, some are, however, preserved in Latin translations, and a few only in Arabic His most important anatomical and physiological works are *De Anatomicis Administrationibus* and *De Usu Partium Corporis Humani* His anatomical and physiological writings are by far the most valuable of his works They contain undoubted evidence of his familiarity with practical anatomy, but whether he derived his knowledge from dissections of human bodies or those of the lower animals is uncertain The latter is the most probable view, (1) because he frequently recommends the dissection of apes,

bears, goats, etc, and (2) because he mentions, as something extraordinary, that those physicians who attended the Emperor M Aurelius in his wars against the Germans had an opportunity of dissecting the bodies of the barbarians His pathology was very speculative and imperfect In his diagnosis and prognosis he laid great stress on the pulse, on which subject he may be considered as the first and greatest authority, for all subsequent writers adopted his system without alteration He likewise placed great confidence in the doctrine of critical days, which he believed to be influenced by the moon In materia medica his authority was not so high as that of Dioscorides Numerous ingredients, many of which were probably inert, enter into most of his prescriptions, and he seems to place a more implicit faith in amulets than in medicine His practice is based on two fundamental principles (1) that disease is something contrary to nature and is to be overcome by that which is contrary to the disease itself, and (2) that nature is to be preserved by that which has relation to nature Judged by modern standards, his ideas and practice were of course absurd

Before Galen's time the medical profession was divided into several antagonistic sects, including the Dogmatici, Empirici, Eclectici, Pneumatici, and Episynthetici After his time all these sects merged into one, the Galenici The subsequent Greek and Roman medical writers were mere compilers from his writings, and as soon as his works were translated (in the ninth century) into Arabic, they were at once adopted throughout the East, to the exclusion of all others The Greek text has been published four times The first edition was the Aldine, printed in 1525, in five folio volumes, the most complete edition is that of Kuhn, in 20 octavo volumes, the publication of which extended from 1821 to 1833 Galen's minor works were edited by Muller and Helmrich, and published in three volumes at Leipzig (1884–93) Several of Galen's works have been translated into French or German Kidd, in the *Transactions of the Provincial Medical and Surgical Association*, vol vi (London, 1837), gives a good account of Galen's anatomical and physiological knowledge Consult Daremberg, *Exposition des connaissances de Galien sur l'anatomie* (Paris, 1841), an epitome of which in English has been published, from the pen of Coxe (Philadelphia, 1846) Consult also Ilberg, "Die Schriftstellerei des Klaudios Galenos," in the *Rheinisches Museum fur Philologie* for 1889, 1892, and 1896 See EMPIRIC

GALEN, ga'len, CHRISTOPH BERNHARD VON (1606–78) A German prelate and soldier He was born in Bispink, Westphalia, and was educated at the universities of Cologne, Mainz, Louvain, and Bordeaux After being canon of Munster and commander of a regiment on the Rhine, he was made Prince Bishop of Munster in 1650 He was exceedingly ambitious and strove to increase his power, both by reducing his subjects to complete submission and by extending his possessions without By 1661 he had made himself master of the city, and he turned at once to foreign alliances to carry out his designs In 1664 he led his forces against the Turks With a well-trained army he joined England against the Netherlands in 1665, but was forced to make peace in 1666. He joined Louis XIV against the Dutch (1672) and waged war successfully against them and then turned his arms against the Elector of Brandenburg and the Emperor In 1675 he joined the Emperor against France, he next helped the Danes against Sweden and secured the Duchy of Verden and part of the Duchy of Bremen, in 1677 he helped the Spaniards against the French, in 1678 he invaded East Friesland and extorted a large war indemnity He died Sept 19, 1678, during the negotiations leading to the Peace of Nymwegen In spite of his military activity he found time to introduce many meritorious ecclesiastical reforms Consult Minn, *Die Lebensbeschreibungen des Christoph von Galen* (Munster, 1907), and Heers, *Die Wahl Christoph von Galen zum Furstbischof von Munster* (ib, 1908)

GALEN, PHILIPP See LANGE, ERNST, P K

GALENA. A city, port of entry, and the county seat of Jo Daviess Co, Ill, 17 miles by rail southeast of Dubuque, Iowa, on the Galena River, which affords good water power, and on the Illinois Central, the Chicago and Northwestern, and the Burlington railroads (Map Illinois, D 1). It has a public library, a fine United States government customhouse, a public hospital, an artesian water system, and Grant Park, in which is a statue of General Grant Galena has extensive lead and zinc mines, two large iron foundries, machinery-manufacturing plants, iron-bridge works, furniture and cigar factories, brickyards, marble, granite, and cement works Under a charter of 1852 the government is vested in a mayor, biennially elected, and a city council The city contains a large electric-light plant, which furnishes light and power to the mines and towns within a radius of 60 miles Pop, 1900, 5005, 1910, 4835 Galena (named from the abundance of lead sulphide or galena ore in the vicinity) was settled in 1827 and was incorporated as a city in 1839 Gen U S Grant lived here from May, 1860, until the opening of the Civil War, and the Grant homestead still remains as one of the features of the city

GALENA A city in Cherokee Co, Kans 7 miles west of Joplin, Mo, on the Missouri, Kansas, and Texas and the St Louis and San Francisco railroads (Map Kansas, H 8) It is engaged chiefly in mining, being the centre of an important lead and zinc region Among the industrial establishments are lead smelters, a large foundry, and a planing mill The government is administered by a mayor, who holds office for two years, and a unicameral council, which elects the deputy marshals and police The mayor nominates the collector, sexton, and engineer, other officials are chosen by the people Galena was settled and incorporated in 1877 The water works are owned by the city Pop, 1890, 2496, 1900, 10,155, 1910, 6096

GALENA (Lat, from Gk γαλήνη, *galēnē*, lead ore), or LEAD GLANCE A lead sulphide that crystallizes in the isometric system, notably in cubic or in octahedral crystals It also occurs in fibrous, granular, or cryptocrystalline massive forms, and has a pure lead-gray color and a metallic lustre Galena is characterized by a marked cubic cleavage and by its great relative weight It occurs in beds and veins, both in crystalline and amorphous rocks, and is one of the most widely distributed of the metallic sulphides It is found in Freiberg, Saxony, in Přibram, Bohemia, in Spain, in Cornwall, Derbyshire, and Cumberland, England, in New

South Wales, Mexico, and at various other localities throughout the world In the United States it occurs in caves or gash veins in stratified limestone, especially at various localities in Illinois, Iowa, Missouri, and Wisconsin When pure, it contains 86 6 per cent of metallic lead, but it is usually accompanied by other metals, such as antimony, bismuth, cadmium, zinc, and especially silver It is an important ore of lead and is often worked also for silver, especially in Colorado, Idaho, Montana, and other Rocky Mountain States, and in British Columbia A coarse-grained variety of galena is used to glaze pottery and is sometimes called *potters' ore* See LEAD

GALEN'IC, GA'LENIST. Words having reference to the controversies of the period of the revival of letters, when the authority of Galen was strongly asserted against all innovations and particularly against the introduction of chemical methods of treatment into medicine The Galenists adhered to the ancient formulas, in which drugs were prescribed either in substance or in the form of tinctures and extracts, etc, while the chemists professed to extract from them the essences, or quintessences—i e, substances in small bulk, presumed to contain the whole virtues of the original drugs in a state of extreme concentration, or purified from all gross and pernicious or superfluous matter Medicines prepared by decoction or infusion, as distinguished from those prepared by chemical processes, are still termed *galenic* medicines

GALEOMYOMACHIA, gā'lê-ō-mī'ō-mā'kī-a (Lat, from Gk γαλεομυομαχία, Battle of the Cats and Mice) A Greek mock-heroic poem by Theodorus Prodromus, a twelfth-century monk In its general features it is only an imitation of the *Batrachomyomachia* (q v)

GA'LEOPITHE'CUS See COBEGO

GALEOTTO, gä'lä-ōt'tō, PRINCIPE Another title of Boccaccio's *Decameron* (q v), suggested by the name of the book, to the reading of which Dante makes Francesca attribute her sin with Paolo

GALERIE DES GLACES, gä'le-rē' dä glas (Fr, Gallery of Mirrors). A famous gallery in the Palace of Versailles, France, so called because of the range of huge plate-glass mirrors which on one side of the room correspond to the great windows on the other It is one of the most magnificent rooms in the world, and forms the chief feature of the new garden front or wing first added by Mansart, under Louis XIV, to the earlier palace of Louis XIII It is nearly 250 feet long, 40 feet wide, and over 20 feet high, and is profusely adorned with paintings, etc, of the time of Louis XIV It was designed for balls and fêtes and on particularly grand occasions was also used as the throne room In it William I was crowned German Emperor in 1871 during the siege of Paris

GALE'RIUS, VALERIUS MAXIMIANUS (?–311 A D) A Roman Emperor (305–311) He was born, of humble parentage, near Serdica in Dacia, entered the Imperial army, and rose from one grade of military rank to another until Diocletian conferred on him, along with Constantius Chlorus, the title of Cæsar (292) and gave him his daughter in marriage and the government of the Illyrian provinces On the abdication of Diocletian (305), he and Constantius became *Augusti*, or joint rulers, of the Roman Empire On the death of Constantius at York (306), the troops in Britain and Gaul immediately declared their allegiance to his son Constantine (afterward Constantine the Great, q v), much to the chagrin of Galerius, who expected the entire sovereignty of Rome to fall into his hands He died in 311 Galerius was a brave soldier and a skillful commander, but appears to possess no other claims to the respect of posterity He hated the Christians, and it is believed that it was he who forced Diocletian to issue his famous edict against them, which caused the last of the Imperial persecutions It is highly probable that his treatment of the adherents to the Christian faith was determined in great part by a politic opposition to Constantius and his son, who tolerated, and even respected, the new opinions and practices

GALES, JOSEPH (1786–1860) An American journalist, born in Eckington, Yorkshire, England His father, Joseph Gales (1760–1841), was a printer in Sheffield, who was compelled to emigrate to America in 1793 because of his republican principles The son was educated at the University of North Carolina, followed the trade of his father, and in 1807 settled in Washington, where he became the assistant and partner of Samuel Harrison Smith in the publication of the *National Intelligencer* In 1810 Gales became sole proprietor of the journal and made it a triweekly publication, and in 1813, he having previously formed a partnership with his brother-in-law, William Winston Seaton, the paper was issued daily and so continued until 1867, after the death of both publishers For many years Gales and Seaton were the official printers to Congress, and the files of the *National Intelligencer*, containing a running account of the debates in both Houses, are one of the most valuable sources of United States congressional history for more than a quarter of a century Under the title of *Annals of Congress* Gales and Seaton published (1834–56, in 42 vols) the debates in Congress from 1798 to 1824, together with the more important documents and laws, and under the title of *Register of Debates in Congress* (29 vols), continued the publication in similar form to cover the years 1824–37

GALES'BURG. A city and the county seat of Knox Co, Ill, 43 miles east by north of Burlington, Iowa, on the Chicago, Burlington, and Quincy and the Atchison, Topeka, and Santa Fe railroads (Map Illinois, D 4). It is the seat of Knox College (nonsectarian), founded in 1837, Lombard College (Universalist), established in 1852, Corpus Christi Lyceum, St Mary's School, and St Joseph's Academy (Roman Catholic). It is the scene of a famous Lincoln-Douglas debate of 1859 The city has an attractive situation and is widely known for its educational facilities There are several fine parks, two hospitals, and a public library Among the industrial establishments are the Burlington Railroad shops and stockyards, brickmaking plants, boiler and engine works, iron foundries, farming-implement works, cornice works, carriage and wagon factories, and overall, mitten, and typewriter factories Galesburg also has extensive wholesale and jobbing interests The government is administered under a general State law of 1872, by a mayor, elected every two years, and a unicameral council The majority of subordinate administrative officials are appointed by the executive, subject to the consent of the council The city owns and operates its water works and electric-light plant Pop., 1900, 18,607, 1910, 22,089, 1914 (U S est), 23,570, 1920, 23,834 Galesburg was settled in 1837

by a company from New York State and was named in honor of the Rev George W Gale, who had planned the town as a site for a theological seminary and as a rallying place for 'free-soilers," since the proslavery immigration was then threatening to make Illinois a slave State The city was chartered in 1857 Consult *History of Knox County* (Chicago, 1878), and A W Dunn, *An Analysis of the Social Structure of a Western Town* (ib, 1896)

GALE'TON A borough in Potter Co, Pa, 50 miles southeast of Bradford, on the Buffalo and Susquehanna Railroad, and on Pine Creek (Map Pennsylvania, F 2) It has railway shops, lumber and knitting mills, a gasket factory, stave and heading mills, a hub factory, brewery, a tannery, and a stone quarry Pop, 1900, 2415, 1910, 4027

GALI, gä'lē FRANCISCO (1539–91) A Spanish navigator, born in Seville The Viceroy of Mexico engaged him to find a harbor on the western coast of America for Spanish vessels returning from the East Indies, and he set out from Acapulco with that object in view He visited the Philippines and other neighboring islands and Japan and on his way home (1584) discovered the coast of California Linschot translated into Dutch Gali's account of his expedition and included it in his work *Track Charts of the Indies* (1596), and Wolf made an English translation in 1598. From a French version of the same narrative a Spanish translation was also made (1802), and there are in the National Library of Mexico fragments of an account of the expedition written by Gali, under the title *Viaje, descubrimientos y observaciones de Acapulco á Filipinas*

GALIANI, gä-lyä'nē, FERDINANDO (1728–87) An Italian savant, born in Chieti in the Abruzzi Philosophy, archæology, history, and more especially the science of political economy, were his favorite studies, but he first attracted notice by a clever squib on the death of the public executioner This consisted of a collection of essays eulogistic of the deceased, in which the style of the president and leading members of the Neapolitan Academy was admirably imitated His next publication, *Della Moneta*, written when he was barely 20, evinced his great learning and powers of reflection and is a contribution to the science of political economy In 1751 he visited the chief cities of Italy and was everywhere honorably received On his return to Naples he collected a rich assortment of stones and volcanic matter of Vesuvius, which, accompanied by a thesis, he subsequently presented to the Pope On one of the stone specimens he engraved the following suggestive inscription "Beatissme pater, fac ut lapides isti panes fiant," and received, by way of answer, the rich prebend of Amalfi, for which he had previously qualified himself by entering into orders In 1759 he became Secretary to the Neapolitan Embassy at Paris, from which period dates a voluminous correspondence with political, scientific, and literary personages of the day, an edition of which has appeared by Percy and Maugras (Paris, 1881) In 1767 he visited England, whose social and political institutions he studied On his return to Paris he wrote another treatise on political economy, entitled *Dialoghi sul commercio del grano*, in which he argues against both the extreme protectionists and the pure free traders Being recalled to Naples, he was successively appointed to various posts of trust and importance He died at Naples in 1787, leaving behind him rare collections of music manuscripts, cameos, etc He was as remarkable for his gayety as for his learning Consult Diodati *Vita dell' abate Ferdinando Galiani* (Naples, 1878), Mattei, *Galiani ed i suoi tempi* (ib, 1879), Contes, *Lettres et pensées de l'abbé Galiani* (Paris, 1866), Du Bois-Reymond, *Darwin versus Galiani* (Berlin, 1876), Brunetière in *Etudes critiques*, vol ii (Paris, 1889)

GALICIA, gä-lish'i-ä (Ger *Galizien*) The largest of the Austrian crownlands constituting the northeastern part of the Empire, bounded by Russia on the north and east, Bukowina on the southeast, Hungary on the south and southwest, and Austrian and Prussian Silesia on the west Its area is 30,311 square miles Separated from Hungary by the Carpathians, Galicia inclines towards the north, the interior consisting mostly of hills and elevated plateaus. The northern part is a gently rolling plain. Galicia is traversed by the Vistula and its affluents, and also by the Dniester, which drains the southern part of the crownland The latter river flows southeast and is navigable from Sambor The Pruth also flows through the southern part of Galicia The Vistula is navigable at Cracow and, flowing northeast, forms part of the boundary of Russian Poland Among its tributaries in Galicia are the San and Dunajec, both navigable, and the Bug There are no lakes of consequence, but mineral springs abound, some of them of more than provincial repute The climate, owing to the exposed northern position of the crownland, is colder than that of any other part of Austria-Hungary The winters are generally long and severe, while the summers are hot At Lemberg the mean annual temperature is 46 2°

Galicia is more purely agricultural than any other of the crownlands of Austria, no less than 77 per cent of its population depending for a living directly on the soil The soil, with the exception of some sandy and marshy districts, is fertile The production of cereals is generally more than sufficient to meet the domestic demand, considerable quantities being exported Of the total area of approximately 7,850,000 hectares, arable land amounted in 1910 to about 3,802,000 hectares, gardens, 108,700, meadows, pastures, etc, 1,646,200, woodland, 2,019,200, lakes, marsh, etc, 21,000, unproductive (untaxed), 252,000 In 1912 the arable land amounted to 3,806,700 hectares The table below shows the area in hectares and production in metric quintals of the principal crops in 1911 and 1912, with the average production per hectare in 1912

	Hectares		Quintals		Qs ha
	1911	1912	1911	1912	1912
Wheat	529,241	567,935	6,382,251	7,637,250	13.4
Rye	701,746	697,973	8,319,458	8,616,828	12 3
Barley	340,034	317,208	4,299,123	3,734,013	11.8
Oats	705,613	690,238	8,435,085	7,025,786	10 2
Corn	62,598	61,343	719,881	664,657	10 8
Buckwheat	61,347	61,007	612,951	463,506	7 6
Pulse	128,126	129,217	1,417,348	1,086,973	8 4
Hops	2,166	2,175	7,164	11,565	5 3
Potatoes	514,226	506,107	64,831,058	53,880,591	106 5
Sugar Beets	6,233	6,448	1,376,715	1,474,982	228 8
Cabbage	16,697	17,073	2,230,794	2,837,830	166 2
Tobacco	1,938	1,437	28,284	22,548	15.7

More than one-half of the horses of Austria are in Galicia, and more than one-fourth of the cattle and the swine At the end of 1910 Galicia had 905,807 horses, 2,505,012 cattle (of which 1,591,548 cows), 1,835,935 swine, 358,959 sheep, and 19,284 goats The unequal distribution of the land is shown by the fact that while one-third of the cultivable area is in the hands of large landholders owning estates of over 1400 acres each, about one-half consists of holdings of less than 14 acres in extent This state of affairs, together with the industrial backwardness of the country, is chiefly responsible for the wretched condition of the agricultural classes Most of the peasants are unable to make a living from their small farms, and consequently large numbers are obliged to emigrate for a part of the year to Russia, Russian Poland, and Germany, where they work for low wages, while their families attend to the farms at home

The forests of Galicia occupy about 25 7 per cent of the total area of the country and yield large quantities of timber for export to foreign countries, chiefly to Germany The mineral resources of Galicia are not important, with the exception of coal, salt, and petroleum Of rock salt there are extensive deposits, those of Wieliczka being famous Petroleum is obtained in large quantities, and the refining industry is assuming very great importance. In 1912 the coal output amounted to 1,910,532 metric tons, or a little less than one-eighth of the total output of Austria The value of the salt production in 1911 was 18,046,000 kronen and in 1912 16,898,000 kronen Austrian petroleum production is limited to Galicia In 1900 the combined output of petroleum and ozocerite was 3,492,167 metric quintals, valued at 22,699,354 kronen, in 1910, 17,681,885 quintals, 46,992,059 kronen, in 1911, 14,897,824 quintals (of which 14,878,421 quintals petroleum and 19,403 quintals ozocerite), 49,608,865 kronen The manufactured articles of Galicia are mainly the output of house industries Weaving, brewing, and distilling, and the production of small wooden articles are the leading industries There is, however, an improvement in some branches of manufacture, notably in that of textiles The trade is almost exclusively in the hands of the Jews The leading exports are petroleum, salt, ozocerite, lumber, grain, cattle, and linens In 1911 there were 2560 miles of railway

The constitution of Galicia dates from 1861 The Diet is composed of 154 members, consisting of the three archbishops, five bishops, two rectors of universities, 44 representatives of the landed aristocracy, 20 representatives of towns and industrial centres, 3 from the chambers of commerce and industries, and 77 from the rural communities In the Austrian Reichsrat Galicia is represented by 78 delegates, of whom 15 are elected by all voters, while, of the remaining 63, 20 are sent by the large landholders, 13 by the town, 3 by the chambers of commerce and industry, and 27 by the rural communities For the purpose of administration Galicia is divided into 82 administrative districts and the two cities of Lemberg and Cracow

The population of Galicia increased from 6,607,816 in 1890 to 7,315,939 in 1900 and 8,025,675 in 1910 (census of December 31) The estimated population in 1912 was 8,160,783 The 1910 population was 28 089 per cent of the total for Austria Pop, per square kilometer, 84 in 1890, 93 in 1900, and 102 in 1910 Males numbered 3,938,315 in 1910, and females 4,087,360, there being 1038 females to each 1000 males Foreigners numbered 45,198 (about two-thirds Russians) The vernacular of the remainder (7,980,477) was almost limited to Polish and Ruthenian Polish, 4,672,500 (58 55 per cent), Ruthenian, 3,208,092 (40 20), German, 90,114 (1 13), Bohemian, Moravian, Slovak, 8718 (0 11) Of the total population in 1910 Roman Catholics numbered 3,731,861 (46 50 per cent), Greek Catholics, 3,379,616 (42 11), Jews, 871,906 (10 86) Population of the larger cities and towns according to the 1910 census Lemberg, the capital, 206,113, Cracow, 154,141, Przemyśl, 54,078, Kolomea, 42,676, Tarnów, 36,731, Drohobycz, 34,665, Tarnopol, 33,871, Stanislau, 33,328, Stryj, 30,895, Neusandez, 25,004, Jaroslau, 23,965, Rzeszów, 23,688, Podgórze, 22,322, Knihinin Wieś, 22,143, Sambor, 20,257, Brody, 18,055 Higher education is afforded by universities at Cracow and Lemberg, and by a technical high school at Lemberg

The original Germanic population of what is now Galicia was replaced at the beginning of the Middle Ages, at the time of the great migration of nations, by the Slavic Poles and Ruthenians, who settled to the west and the east respectively of the river San In the twelfth century the principalities of Halicz (Galicia) and Vladimir (Lodomeria) rose to prominence from among a host of petty states Galicia in general acknowledged the suzerainty of the dukes of Cracow, while Lodomeria was under the control of the ruler of Kiev The dissensions between the two principalities afforded an opportunity for the intervention of the Hungarians, the Russians, and the Poles, but such periods of foreign rule were brief In 1198 Roman, Prince of Lodomeria, succeeded in annexing Galicia to his dominions and made himself virtually independent of Poland and Hungary, the two duchies were separated in 1215, but were once more united by Daniel Romanovitch (1222–66), who by his skillful diplomacy in his relations with Hungary and the Pope intrenched himself firmly in power During his reign and those of his immediate successors the country enjoyed remarkable prosperity and attained to a high degree of civilization In 1340 the house of Roman died out, and soon after Galicia and Lodomeria came under the sway of Casimir the Great of Poland, and except for an interval of a decade and a half (1370–86) formed a part of Poland till the first partition of that country in 1772 In that year the territory of Galicia, under the title of the Kingdom of Galicia and Lodomeria, was annexed by Austria, whose portion was increased in 1795 by the addition of West or New Galicia Austria was forced in 1809 to cede West Galicia and Cracow to the Grand Duchy of Warsaw, and in 1810 a portion of East Galicia to Russia, but it recovered possession of the latter in 1814, while the former remained in the hands of Russia, with the exception of a fragment which was erected into the Republic of Cracow. In 1846 the Republic of Cracow, which had become the centre of the Polish revolutionary movement, was suppressed and handed over to Austria, which incorporated it with the Crownland of Galicia The period since 1848 has been marked by a fierce struggle between the Polish and Ruthenian nationalities, the former seeming to retain their almost absolute ascendancy, and the latter striving to win their share of political rights and a voice in the government Galicia

to-day shares more in the central government and has more local freedom than any of the other Austrian provinces This condition was brought about first by the constitution of 1861 and then by successive steps of a similar nature The province was the scene of extended operations by the Russians in the European war of 1914 For details see WAR IN EUROPE Consult Jandaurek, *Das Konigreich Galizien* (Vienna, 1884), and Lowell, *Governments and Parties in Continental Europe* (New York, 1897)

GALICIA, *Sp pron* ga-lē'thē-a A political division of Spain, bounded on the north by the Bay of Biscay, on the east by the provinces of Asturias and León, on the south by Portugal, and on the west by the Atlantic (Map Spain, A 1) Area, 11,256 square miles The surface is generally composed of numerous isolated mountains and hills intermingled with valleys and elevated plains, but there are few connected mountain chains The chief river is the Minho The climate is moist but not unhealthful, and the annual rainfall heavy In the river valleys the soil is fertile and well cultivated Agriculture and stock raising are the leading industries, lumber is produced Minerals and precious stones are found in the mountains, there are many mineral springs, and the waters along the coasts abound in fish The unequal distribution of land and the density of population are responsible for the impoverished state of the masses Though many natives emigrate to Portugal and the more progressive parts of Spain, as well as to North and South America, the population has continued to increase, while modern improvements have not been installed Pop, 1900, 1,980,515, 1910, 2,108,914 The inhabitants are called *Gallegos* and resemble the Portuguese rather than the Spaniards, speaking a distinct dialect Administratively Galicia is divided into the four provinces of Corunna, Lugo, Orense, and Pontevedra The seat of the captain-general is Corunna

Galicia was originally occupied by a tribe known as the Callaici, or Gallaici, whence the name of the region It was first subjugated by the Romans in the time of Augustus Early in the fifth century, when the torrent of Suevi and Vandals swept across the Pyrenees, Galicia, which then included Old Castile, was occupied by the former After remaining independent for almost two centuries, it became part of the Visigothic kingdom under Leogovild in the latter part of the sixth century At the time of the Saracen invasion great numbers of the Visigoths fled thither The Saracens were driven out in 739 by Alfonso the Catholic of Asturias Galicia shared the fortunes of Asturias and of León and finally became part of the Kingdom of Castile On the death of Ferdinand the Great of Castile and León, in 1065, it formed for a few years an independent kingdom under his son Garcia Consult A M Meakin, *Galicia, the Switzerland of Spain* (New York 1909), and W Wood, *A Corner of Spain* (ib, 1910)

GALIGNANI, ga'lē-nya'nē A family of European publishers, of whom the most prominent were GIOVANNI ANTONIO (1752–1821), a distinguished linguist, and his sons JOHN ANTHONY (1796–1873) and WILLIAM (1798–1882) For a time the father, a native of Brescia, lived in London, where his sons were born, but, removing to Paris, founded there an English library and the periodical *Repertory of English Literature* He began in 1814 the publication of *Galignani's Messenger* This paper, continued by his sons, was later known as the *Messenger* Its aim was to establish cordial relations between France and England It enjoyed a high reputation In 1884 the Galignani family disposed of their interest in it, and it appeared as the *Daily Messenger* until discontinued in 1904 At Corbeil the brothers set up a hospital for needy Englishmen, and in 1889, at Neuilly, the Galignani Home for distressed printers

GAL/ILEE See PALESTINE

GALILEE The name applied in England to a porch or chapel placed near the entrance to a mediæval monastic church, beyond which women were not permitted to pass In abbeys, e g, the monks came to the Galilee to see their female relatives The term "Galilee Porch" was also used The name is supposed to have been suggested by Mark xvi 7 "He goeth before you into Galilee there shall ye see him" said to have been quoted by the monks in ushering into the Galilee the women who thus visited the abbey A portion of the nave was sometimes marked off by a step, or, as at Durham, by a line of blue marble, to mark the boundary within which women were not permitted to pass There are fine specimens of galilees at the cathedrals of Salisbury, Wells, Lincoln, Ely, and Durham, and the name is also applied to the little library in the central arch of the west end of Peterborough Cathedral

GALILEE, SEA OF A body of water in Palestine, through which flows the river Jordan The old Hebrew name was Chinnereth, or Chinneroth (see Num xxxiv 11, Josh xii 3, xiii 27), also used of a city (Josh xix 35) and of a district (1 Kings xv 20), both in the neighborhood of the lake The designation, "Lake of Gennesaret," or, more correctly, "Gennesar," from the "Land of Gennesaret," on the northwest shore of the lake, was in use certainly as early as the first century B C (1 Macc xi 67) This is the name used almost without exception in Josephus The derivation and exact meaning of both terms, Chinnereth and Gennesar, are not certainly known The later name, Gennesar, is not thought to have been derived from Chinnereth It may be a compound from *gan*, 'garden,' and *Nesar*, perhaps an old name for the region bordering on the northwest or west shore of the lake, or even for Galilee in general In the Gospels "Sea of Galilee" is the usual designation After Herod Antipas built the city of Tiberias on its shore it became known as the Sea of Tiberias, which is the basis of the modern name, Bahr Tabariyeh The lake is 13 miles long by 7 miles wide, irregularly oval in shape widest at the northern end It lies in a deep basin in the great cleft which extends from the Lebanon to the Red Sea The surface is 682 feet below the level of the Mediterranean Its greatest depth is not over 200 feet It is completely encircled by a beach, the surrounding hills in no case touching the water's edge Along the eastern shore the beach is but a narrow strip about ½ mile wide, beyond which the hills rise abruptly to a height of nearly 2000 feet above the lake To the south is the low, rapidly descending Jordan valley, as wide as the lake itself From the exit of the Jordan to Tiberias, on the west, a mile or so from the water, lies a black and barren ridge of the Galilean hills, while north of this, extending nearly to the entrance of the Jordan, is the broad and exceedingly fertile plain of Gennesaret (Consult

Josephus, *Jewish War*, bk iii, chap. 10, § 8, for a description of its marvellous productivity) The water of the lake is sweet, except in the neighborhood of the hot springs near Tiberias, and somewhat warm The hot springs are evidence that the volcanic activity, which in ages past wrought such great changes in this locality, has not entirely ceased The surface of the plateau east of the lake is the overflow of volcanoes once active in the Hauran Shut in by high hills except to the south, the lake is subject to sudden and severe winds, which, rushing down the ravines, often lash the waters into dangerous fury (cf Mark iv 37, Luke viii 23). The neighborhood of the lake once teemed with population (cf Josephus, *Jewish War*, iii 2). Several of the great trade routes of southwestern Asia converged here Communication with the whole world was frequent and easy The waters abounded in fish and were covered with sailing craft, many of which were used in the extensive fishing industry The fertile western shore was highly cultivated and yielded its products through all the months of the year Around this small sheet of water were clustered some 9 or 10 flourishing cities, each, it is said, with not less than 15,000 inhabitants Chorazin was on the slopes west of the Jordan's entrance, Capernaum and Magdala were in the plain of Gennesaret, on the western shore was Tiberias with its famous and popular baths, and, farther south, Tarichæa with its great fish-curing industry, whence the fish of Galilee were exported throughout the Roman world, Hippos and Gamala were on the eastern plateau, with Gadara a few miles southeast, Bethsaida was at the entrance of the Jordan, and Sinnabris at its exit, with Homonæa 2 miles down the valley. At present all these, except Tiberias, have passed away, the sites of some cannot be identified, the soil is cultivated in but few spots, and the hills are treeless and deserted Quite recently, however, plans have been formed to revive the fishing industry

It was about the northern part of this sea that Jesus passed the greater part of His public ministry. Four of the first disciples were Galilean fishermen (Matt iv. 18–22; Mark i 16–20), and the miracles of the walking on the water (Matt xiv 22–33), the miraculous draft of fishes (Luke v. 4–7), the stilling of the tempest (Matt. viii 23–27, Mark iv 35–41, Luke viii 22–25), the feeding of the multitude (Matt xiv 13–21, xv 29–39, Mark vi 31–44, viii 4–9, Luke ix 10–17, John vi 1–14), and many other miracles and events in the life of Jesus are closely associated with the lake Consult Merrill, *Galilee in the Time of Christ* (New York, 1891), id, *East of the Jordan* (ib, 1881), George Adam Smith, *Historical Geography of the Holy Land* (London, 1894); F Buhl, *Geographie des alten Palastina* (Leipzig, 1896), Masterman, *Studies in Galilee* (Chicago, 1909) See also PALESTINE

GALILEI, ga-lē-lā'ē, VINCENZO (c.1533–c 1600) An Italian musician and mathematician. He was born at Florence and was the father of Galileo Galilei the astronomer As a composer, he is chiefly important for his songs with lute accompaniment, which are generally regarded as introducing the monody subsequently adopted by Peri, Caccini, etc, the accredited founders of the *dramma per musica* More valuable are his writings, the most important of which are a polemical discourse on the works of Zarlino of Chioggia (1589), and the treatise *Il Fronimo, dialogo sopra l'arte del bene intavolare e rettamente suonare la musica* (1583) He was an accomplished lute player and violinist, and a prominent member of the historic coterie of artists whose rendezvous was the house of Count Bardi His death occurred at Florence.

GALILEO, găl'ĭ-lē'ō, *It pron* ga'lē-lā'ō, or **GALILEO GALILEI**, ga'lē-lā'ō ga'lē-la'ē (1564–1642) An Italian physicist and astronomer, one of the founders of modern experimental science He was born in Pisa, in February, 1564, of a Florentine family more ancient than opulent By desire of his father, a mathematician of considerable ability, he directed his early studies to medicine and the prevailing Aristotelian philosophy, the dogmas of which he soon came to disbelieve Later, however, while still at the University of Pisa, he devoted himself to the study of mathematics and physical science At the age of 18 he made one of his most important discoveries Happening on one occasion to observe, in the cathedral of Pisa, the oscillation of a lamp casually set in motion, he was struck with the apparent measured regularity of its vibrations, and having tested the correctness of this observation by comparing the beat of his own pulse with the action of the pendulum, he concluded that by means of this equality of oscillation a simple pendulum might become an agent in the exact measurement of time This discovery he subsequently utilized by the successful application of the pendulum in constructing a clock for astronomical purposes His bias towards mechanical construction and experimental science received a new impulse from his intercourse with a friend of his father's, Ostilio Riccio, who consented to give him systematic instruction in pure mathematics Such was Galileo's absorption and delight in his new studies that his father at length sanctioned his abandonment of the art of medicine, in order that he might concentrate his powers on his chosen sciences The first fruit of his geometrical investigations was the invention of a hydrostatic balance, by which the specific gravity of solid bodies might be ascertained with great accuracy In 1589, the fame of Galileo's extraordinary learning having reached the Grand Duke of Tuscany, he was appointed professor of mathematics in the University of Pisa About this period he turned his attention to the then very imperfectly comprehended laws of bodies in motion, and, in opposition to accepted notions, he propounded the theorem that all falling bodies, great or small, descend with equal velocity This soon led him to the discovery of the law regulating the motion of falling bodies, which was proved correct by experiments made from the summit of the leaning tower of Pisa, greatly to the chagrin of the Aristotelians, whose enmity to Galileo had now grown more decided In consequence he relinquished his chair at Pisa and retired to Padua, where, in 1592, he accepted the invitation of the Venetian Senate to lecture on mathematics in the university for the space of six years. It is also said, however, that Galileo lost his chair at Pisa from having ridiculed the mechanical pretensions of Giovanni de' Medici, son of Cosimo I Galileo's engagement at Padua was eventually prolonged to the term of 18 years, but so urgent was his desire to return to his birthplace that he sought a restoration to his former post at Pisa and was gratified by an assent being accorded by Cosimo II, with exemption from any but a voluntary exercise of the

duties of professorship During his sojourn at Padua his course of lectures enjoyed extraordinary popularity, crowds of pupils flocked to hear him from all parts of Europe, and he was the first to adapt the Italian idiom to philosophical instruction Among his various discoveries may be noticed a species of thermometer, a proportional compass or sector, and, more important than all, the construction of the refracting telescope for astronomical investigation In 1609 he offered his first complete telescope to the Doge of Venice, Leonardi Deodati, by whom it was tested from the tower of St Mark In the same year he constructed a microscope, and then commenced his astronomical researches by means of his own telescope He speedily concluded that the moon, instead of being a self-luminous and perfectly smooth sphere, owed her illumination to reflection and presented an unequal surface deeply furrowed by valleys and mountains of great extent The Milky Way he pronounced a tract of countless separate stars, and these discoveries were crowned by a still more important series of observations, which led to the discovery of the four satellites of Jupiter on the night of Jan 7, 1610 (though it was not till the 13th of the same month that he came to the conclusion that they were satellites and not fixed stars), which he named the Medicean stars He also was the first to note movable spots on the disk of the sun, from which he inferred the rotation of that orb He returned to Tuscany in 1610, where renewed quarrels with the Aristotelians disquieted and embittered his existence In 1611 he visited Rome and was received with great distinction, being enrolled a member of the Lincei Academy, but four years later, on a second visit, his reception was widely different, as by that time, in his work on the solar spots, he had openly advocated the Copernican system and was in consequence denounced as a propounder of heretical views He repaired again to Rome, to demand an experimental inquiry into the soundness of his views, but the Grand Duke, apprehending inquisitorial dangers for his favorite, summoned him back to Tuscany, at the same time the Pope, through the famous Cardinal Bellarmin (a sincere friend of Galileo's), commanded him to abstain from all future advocacy of heretical doctrines Some time after, Galileo wrote his most famous work in the form of a dialogue between three fictitious interlocutors—the one in favor of the Copernican system, the second an advocate of the Ptolemaic, and the third a satirical personage who begins by agreeing with the Ptolemaic arguer, but usually ends by being convinced by the Copernican, and then assists in belaboring poor Simplicio, the supporter of Ptolemaic motion. In 1630 Galileo contrived to obtain the papal *imprimatur*, which was subsequently revoked, but, having got a similar authorization at Florence, he published, in 1632, this exposition of his opinions under the title of *Un dialogo dei due massimi sistemi del mondo* Hardly had the work been issued, when it was given over to the jurisdiction of the Inquisition Pope Urban VIII, previously Cardinal Barberini, and until now a friend and eulogist of Galileo, was led to believe that Galileo had satirized him in this work under the name of Simplicio, as one who is careless about scientific truth, and who timidly adheres to the saws of antiquity On Sept 23, 1632, Galileo was cited to appear for the second time before the Inquisition During his protracted trial he was allowed to reside as a prisoner in the house of the Tuscan Ambassador His judges condemned him to abjure his scientific theory This he did That he was actually put to the torture is now no longer a question open to dispute, though it is true he was threatened with it His famous whisper, *E pur si muove* (But nevertheless it does move), is a fiction Galileo was sentenced to an indefinite term of imprisonment by the Inquisition This was soon commuted by Pope Urban, at the request of Ferdinand of Tuscany, into permission to reside at Siena and finally at Florence He died on Jan 8, 1642, at the age of 78, and was interred by ducal orders in the cathedral of Santa Croce, where a majestic monument symbolizes his great achievements

Galileo's disposition was truly genial, he enjoyed with keenness the social wit and banter of his friends and the pleasures of the banquet, and the readiness with which he offered or accepted atonement modified a somewhat irascible disposition The great deficiencies in his character were a want of tact to keep out of difficulties and a want of moral courage to defend himself when involved in them His biting, satirical turn, more than his scientific tenets, was the cause of his misfortunes Galileo was of small stature, but of a robust and healthy frame, his countenance was attractive, and his conversation cheerful He loved art and cultivated especially music and poetry. His style is nervous, flowing, and elegant

We may briefly recapitulate Galileo's most important contributions to physical science under the following heads (1) the relation between space and time in the case of falling bodies, (2) the path of projectiles is a parabola, (3) the isochronism of the pendulum, (4) the partial discovery that suction is owing to the pressure of the atmosphere, (5) the reinvention of Aristotle's theory respecting sound, (6) the invention of the telescope, (7) the discovery of the satellites of Jupiter, phases of Venus, and spots on the sun For the nature of these discoveries, see PENDULUM, FALLING BODIES, PROJECTILES, ETC

The best edition of Galileo's collected works is that by Alberi (16 vols, Florence, 1842–56) A new complete edition has been published (20 vols, ib, 1890–1909) at the cost of the Italian government Bibliographies of the literature relating to Galileo have been compiled by Riccardi, Carli, and Favaro Consult Brewster, *The Martyrs of Science, or the Lives of Galileo, Tycho Brahe, and Kepler* (London, 1846); Chasles, *Galileo Galilei* (Paris, 1862), Berti, *Copernico e il vicende del sistema Copernicano* and *Il processo originale di Galileo* (Rome, 1876), Scartazzini, *Il processo di Galileo Galilei e la moderna critica tedesca* (Florence, 1878), Favaro, *Galileo Galilei e lo studio Padova* (2 vols, ib, 1882), Scartazzini, *Galileo Galilei* (Milan, 1883), Wegg-Prosser, *Galileo and his Judges* (Eng trans, London, 1889), Gunther, *Geisteshelden*, vol xxii (Berlin, 1896), Paolo, *La scuola di Galilei nella storia della filosofia* (Pisa, 1900), Fahie, *Galileo His Life and Work* (London, 1903), Muller, *Galileo Galilei und das Kopernikanisches Weltsystem* (Freiburg, 1909)

GALIMBERTI, ga'lêm-bâr'tê, LUIGI (1836–96) A Roman Catholic ecclesiastic and diplomat, born in Rome, where he was educated in law and theology He taught theology in the College of the Propaganda and at the University

of Rome and in 1868 was appointed canon of the Lateran Leo XIII made him secretary of the congregation of extraordinary ecclesiastical affairs, canon of St Peter's at Rome, and Archbishop of Nicæa He was sent on various embassies and was the author of the award which the Pope as arbitrator made in favor of Spain, in her contention with Germany for the sovereignty over the Caroline Islands When, as a result of the struggle of Bismarck against the power of the Catholic church in Germany (Kulturkampf), the relations between the papacy and the German Empire were broken off, it was Galimberti who was sent in 1880 on a mission to Germany, with the result that the oppressive "May Laws" of 1872 were abrogated In 1887–92 he represented the papacy at Vienna, and there also he was fortunate in securing a satisfactory settlement of long-standing differences between the Vatican and Austria-Hungary In 1893 he returned to Rome and was made a cardinal and prefect of the papal archives

GAL'INGALE (*Cyperus longus*) See CYPERUS

GAL'ION A city in Crawford Co, Ohio, 80 miles southwest of Cleveland on the Cleveland, Cincinnati, Chicago, and St Louis and the Erie railroads (Map Ohio, E 4). It is primarily a manufacturing and railroad town, with railroad shops, several carriage factories, brick and tile plants, wheel, wagon, and gear works, lumber mills, manufactories of grave vaults, road machinery, pipe, and automobile gears, and a foundry Galion was laid out in 1831 and was chartered as a city in 1878 There is a Carnegie library here. Its government is administered by a mayor, elected biennially, and a unicameral council The city owns and operates the electric-light plant Pop, 1900, 7282, 1910, 7214

GALITZ'IN See GOLITZIN

GA'LIUM See BEDSTRAW

GALL. See GALLS

GALL, gal, FRANZ JOSEPH (1758–1828). The founder of phrenology, born at Tiefenbronn, Baden He studied medicine at Strassburg and Vienna and settled in the latter place as a practicing physician He became known by the publication of his *Philosophisch-medizinische Untersuchungen uber Natur und Kunst im gesunden und kranken Zustande des Menschen* (1791) But he acquired a much more extensive reputation by his lectures on the structure and functions of the brain, which he began to deliver in 1796 His views were so subversive of received doctrines on the subject of mind that the lectures were prohibited in 1802 by the Austrian government Along with his pupil, Spurzheim (q v), who became his associate in 1804, Gall quitted Vienna in 1805 and during his travels through Germany, Holland, Sweden, and Switzerland, expounded his views in many of the universities and principal cities In 1807 he settled as a physician in Paris and there began lecturing and writing for the propagation of his opinions. On March 14, 1808, he and Spurzheim presented to the Institute of France a memoir of their discoveries, on which a committee of the members of that body (including Pinel, Portal, and Cuvier) drew up an unfavorable report Gall and Spurzheim thereupon published their memoir, with a reply to the report, in a volume entitled *Recherches sur le système nerveux en général et sur celui du cerveau en particulier* (1809). This was followed by their larger work, *Anatomie et physiologie du système nerveux* (1810–19), with an atlas of 100 plates, but, the two phrenologists having parted in 1813, the name of Gall alone is prefixed to volumes iii and iv, and it alone is borne by a reprint of the physiological portion of the work, entitled *Sur les fonctions du cerveau, et sur celles de chacune de ses parties* (1825) In answer to accusations of materialism and fatalism brought against his system Gall had early published a part of the work under the title *Des dispositions innées de l'âme et de l'esprit* (1812) He continued his researches at Montrouge till his death Consult Mobius, *F J Gall* (Leipzig, 1905) See PHRENOLOGY

GALL, LUISE VON See SCHUCKING, LEVIN

GALL, SAINT See SAINT GALL

GAL'LAGHER, WILLIAM DAVIS (1808–94). An American journalist and poet, born in Philadelphia, Pa He was the son of an Irish patriot implicated in the rebellion of 1798 About 1816 his family removed to Ohio, where he learned the printer's trade and contributed to country newspapers In Cincinnati he edited several journals, particularly the *Mirror* (1831), the *Western Literary Journal* (1836), and the *Hesperion* (1838) Much of the verse and prose which appeared in these publications was contributed by the best American writers of the day, and he constantly wrote for them himself He next became connected with the Cincinnati *Gazette* In 1850–53 he was confidential clerk to Thomas Corwin, Secretary of the Treasury Upon his removal to Louisville, Ky, in 1853, he bought a half share in the *Courier* During the Civil War he was again in the employ of the Treasury Department and in 1865 became a pension agent and later a farmer in Kentucky Gallagher was most influential in promoting literary interests in the West His poetical works include *Erato* (3 vols, 1835–37), containing "The Wreck of the *Hornet*," and *Miami Woods* (1881)

GALLAIT, *ga'lā'*, LOUIS (1810–87) A Belgian historical, genre, and portrait painter He was born at Tournai, studied there under the classicist Hennequin and afterward under Van Brée at Antwerp "Christ Healing the Blind" (1833) was purchased by subscription for the cathedral of Tournai, and Gallait received a pension from the state enabling him to study in Paris Here he came under the influence of Delaroche and produced many works, such as "Montaigne Visiting Tasso in Prison" (1836) for the Belgian King, the "Capture of Antioch by Godfrey de Bouillon" (Versailles), and other historical subjects for the French government, and, finally, his "Abdication of Charles V" (1841, Brussels Museum) Exhibited in Germany, where it profoundly influenced native art, and throughout Europe this last work brought him the highest honors He was called by the government to Brussels, where he was the head of an influential school of historical painting. His work shows taste and judgment, but the technique is eclectic and his presentation theatrical and sentimental Other celebrated subjects are "Last Honors to Egmont and Hoorne" (1851, Tournai), "Last Moments of Egmont" (1858, Berlin), and the "Plague at Tournai" (1882, Brussels) His once famous portraits and genre subjects are less important He is represented in the Metropolitan Museum, New York, by the "Minstrel Boy," "The Prisoner," and two aquarelles, and in the Walters Gal-

lery, Baltimore, by four oil paintings and a water color Consult Teichlin, *Gallait und die Malerei in Deutschland* (1853), Henne, in *Annales de l'académie de Belgique* (Brussels, 1890), Dujardin, *L'Art flamand* (ib, 1899), Muther, *Die belgische Malerei im 19ten Jahrhundert* (Berlin, 1904)

GALLAND, ga'lan', ANTOINE (1646–1715) A French Orientalist and numismatist, born at Rollot, near Montdidier, in Picardy After finishing his course at the Lycée he studied Oriental languages at the Collège de France In 1670 he accompanied the French Ambassador De Nointel to Constantinople and made two subsequent trips to the East in the interest of science, collecting a large number of inscriptions, etc In 1701 he was made a member of the Académie des Inscriptions and in 1709 professor of Arabic in the Collège de France The greater part of Galland's writings relate to numismatics and the East, but what secured for him a lasting reputation was his translation of the *Arabian Nights*, in 12 volumes (*Mille et une nuits, contes arabes*, 1704–17) This was the first translation of these stories ever made into any European language, and so little was known about them in Europe that Galland got the credit of being himself the author as well as the translator The translation led not only to the popularity, but also to critical investigations, of the remarkable collection (See ARABIAN NIGHTS) Among his other writings may be mentioned *Paroles remarquables, bons mots, et maximes des Orientaux* (1694) and *Les contes et fables indiennes de Bidpai et de Lokman* (1724) His numismatic and archæological writings will be found chiefly in the *Journal des Savants*, and the *Mémoires* of the Académie des Inscriptions et Belles-Lettres

GALLA OX, or SUNGA See HUMPED CATTLE.

GALLARATE, gal'la-ra'tā A city of Lombardy, in the Province of Milan, north Italy, 2 miles northwest of Milan, with a technical school and important cotton and textile factories It also produces machinery, cabinetwork, buttons, and vehicles Six miles to the west are the electric works of Vizzola, developing 23,000 horse power from the river Ticino. Pop (commune), 1901, 12,000, 1911, 15,868

GAL'LAS, or OROMA (*Gallas*, Conquerors, *Ilm'-orma*, Sons of the Brave) An Ethiopian people in eastern Africa, south of the Abyssinian plateau, numbering 6,000,000, and occupying 400,000 square miles of territory They represent the purest type of the Ethiopian branch of the Hamitic race, called Kushito-Hamites Keane divides these Ethiopian peoples into Somali Hamites, Galla Hamites, Afar (Domakil) Hamites, Abyssinian (Agao) Hamites, Semitized and mixed Hamites, Himyaritic (Abyssinian) Semites, Arab (nomad) Semites, Negroes, and Bantus He pronounces the Gallas to be the finest people in all Africa—tall, shapely, with high, broad foreheads and handsome faces Their color is chocolate, the hair black and kinky They are a pastoral and agricultural people, but their common dangers and mutual jealousies have made them warlike They are divided into tribes and petty kingdoms, having two social classes—the aristocratic *prutuma* (herdsmen) and the plebeian *argatta*, or *kutto* (tillers) They are all more or less subject to the Negus Negusti of Abyssinia In religion they are pagans, Mohammedans, and Sidamas, i.e, members of the Abyssinian Christian church Consult A H Keane, in Stanford's *Africa*, vol i (London, 1907), where all the tribal subdivisions are given, with their exact locations

GALLAS, gal'las, COUNT MATHIAS, DUKE OF LUCERA (1584–1647) A German general in the Thirty Years' War, born in Trent After serving as a mercenary in the armies of Spain and Savoy, in 1618 he became colonel of an infantry regiment in the army of the Catholic League and afterward became one of Wallenstein's most trusted officers For his services at the taking of Mantua (1630), in the War of the Mantuan Succession, he was created a Count of the Empire He commanded the right wing of Wallenstein's army at the battles of Nuremberg and Lutzen From selfish motives he opposed Wallenstein, intrigued against him at Vienna, and after his assassination succeeded to his command He won the decisive battle of Nordlingen over Bernhard of Weimar in 1634, but after varying successes and failures in the four following years he was succeeded as commander in chief, in 1638, by the Archduke Leopold After Leopold's defeat by Torstenson and the Swedes at the second battle of Breitenfeld, in 1642, Gallas was again placed in command, but was defeated in Holstein and again superseded He succeeded Hatzfeld as commander in chief after the latter's defeat at Jankau in 1645, but soon fell ill and was compelled to retire Gallas was called *Heerverderber*, 'army destroyer' See THIRTY YEARS' WAR, and consult the article by Hallwich in *Allgemeine deutsche Biographie*, vol viii (Leipzig, 1878).

GAL'LATIN A city and the county seat of Daviess Co, Mo, 77 miles northeast of Kansas City, on the Chicago, Rock Island, and Pacific and the Wabash railroads and on the Grand River (Map Missouri, C 2) It has a trade in lumber, grain, live stock, and dairy products, and is the centre of an agricultural district, with valuable timber lands. The city contains the Grand River Academy and has municipal water works and an electric-light plant Pop, 1900, 1780, 1910, 1825

GALLATIN A town and the county seat of Sumner Co, Tenn, 27 miles by rail northeast of Nashville, on the Louisville and Nashville Railroad (Map Tennessee, D 1) It is the seat of the Howard Female College and a training school. The town is in a fertile agricultural region and has planing mills, and manufactories of flour and spokes Fine horses and cattle are raised here The water works and electric-light plant are owned by the municipality Pop, 1900 2409, 1910, 2399

GALLATIN, ALBERT (1761–1849). One of the most distinguished of American public financiers He was born in Geneva, Switzerland, Jan 29, 1761, and graduated at the Academy of Geneva in 1779. In 1780 he and a friend, Henri Serre, came to the United States and spent a year at Machias, Me, in trade pursuits, with little success Gallatin then moved to Boston, where he supported himself by teaching French, and in July, 1782, received permission to give instruction at Harvard College. In the following year he explored and invested in lands on the western frontier, and in 1784 established a country store in Fayette Co, Pa, near the Virginia boundary He was in 1789 a delegate to the State Constitutional Convention, and in 1790, as also in the two following years, he was sent to the Legislature by Fay-

ette County, where he was conspicuously active in opposition to the Federal excise law, and where, also, the basis of his reputation was made by his report of the Committee of Ways and Means in the session of 1790–91 In February, 1793, he was elected to the United States Senate and took his seat on December 2, but in the following February the Senate decided, by a party vote of 14 to 12, that he did not possess the proper qualifications as to citizenship, it having been less than nine years, the time prescribed by the Constitution, since he had taken the oath of citizenship and allegiance to the State of Virginia Gallatin was active at the time of the Whisky Insurrection (q v), and although he urged submission to law and the refraining from all improper and illegal acts, nevertheless he went so far in his relations with the insurrectionists as to give himself, both then and later, considerable political embarrassment He was, at the end of the trouble, elected to the Pennsylvania Assembly and from 1795 to 1801 was a member of Congress, where he allied himself with those Republicans who under the leadership of Madison were opposing the administration of the Federalists "In his first term," says his biographer, Stevens, "he asserted his point and took his place in the councils of the party In his second, he became its acknowledged chief In the third, he led its forces to final victory"

He served on important committees and steadfastly opposed the administration, especially in the matter of the Jay Treaty, the increase of the army and navy, and the relations with France Particularly did he attack the administration of the finances, a field with which his pamphlets showed him to be familiar, and his services and abilities in this direction were recognized by Jefferson, who in 1801 made him Secretary of the Treasury, a post which he held until 1813 During these years a marked reduction was effected in the national debt, the practice as to appropriations was made more systematic, the sinking-fund system was improved, and the preparations were made which rendered a war and an increase of the national debt possible without a disorganization of the public financial system. Gallatin also rendered important service in the negotiations which were concluded by the Treaty of Ghent (q v) Of his services in this connection, one of his biographers, Henry Adams, has said "Far more than contemporaries ever supposed or than is now imagined, the Treaty of Ghent was the especial work and the peculiar triumph of Mr Gallatin" Thereafter, declining both a nomination to Congress and an opportunity to resume charge of the Treasury Department, he became Minister to France, filling the post from 1816 to 1823 Three years later he went to London as Minister, remaining one year and concluding two important conventions He had been nominated for the vice presidency by the Crawford Republicans in May, 1824, but withdrew in October to make room for Clay, and in 1843 he declined to enter Tyler's cabinet as Secretary of the Treasury

After the conclusion of his diplomatic service he removed to New York (in 1828), and that city remained his permanent residence until his death. He was president of the National Bank there for some years, but the duties were light, and he had ample time for study and public service He was much interested in the problems of public education and of finance and took an active part in the movement which resulted in the founding of New York University, but his chief interest appears to have been in the study of ethnology, especially of American ethnology He founded the American Ethnological Society in 1842, which for a brief period was a very serviceable agency for the promotion of such studies, and he wrote several valuable essays and monographs on ethnological subjects He did not lose his interest in finance and in history, however, and in every way gave an example of scholarship and of public spirit rarely surpassed by any one in this country

He was twice married, first, in 1789, to Sophie Allegre, who died within a few months and then, in 1793, to Hannah Nicholson, daughter of Commodore James Nicholson, whose death shortly preceded his own He died Aug 12, 1849, at Astoria, L I He published in 1796 a *Sketch of the Finances of the United States* and in 1843 memoirs on the *American Rights to the Northeastern Frontier*, and many minor essays on finance, history, and ethnology, his *Synopsis of the Indian Tribes within the United States, East of the Rocky Mountains, and in the British and Russian Possessions in North America* (1836), and his *Notes on the Semi-Civilized Nations of Mexico, Yucatan, and Central America, with Conjectures on the Origin of Semi-Civilization in America* (1845), being especially noteworthy His *Writings*, which are of great value in the study of the political history of the United States in the first part of the nineteenth century, have been edited by Henry Adams (3 vols, Philadelphia, 1879). Consult Adams, *Life of Albert Gallatin* (Philadelphia, 1879), and Stevens, *Albert Gallatin* ("American Statesmen Series," Boston, 1884)

GALLAUDET, găl'la-dĕt', EDWARD MINER (1837–1917) An American educator of the deaf and dumb, son of Thomas Hopkins Gallaudet He was born in Hartford, Conn, and in 1856 graduated at Trinity College there, and became a teacher in the institution for the deaf and dumb which his father had founded at Hartford In 1857, at the instance of Amos Kendall, he removed with his mother, Sophia Fowler Gallaudet (who was herself deaf and had been a pupil of T H Gallaudet), to Washington, where they organized and took charge of an institution similar to that at Hartford, known as the Columbia Institution for the Deaf and Dumb He became president of its two distinct departments, the Kendall School and the National Deaf Mute College, which in 1893 was named in his father's honor Gallaudet College In 1867–68 he made an extended tour of Europe, visiting the principal institutions for the deaf and dumb, and publishing on his return the results of his investigations in a full and extremely valuable report In 1880 he was a delegate to the international congress of instructors of deaf-mutes, held in Milan, Italy, and in 1883 was president of the convention of American instructors of deaf-mutes at Jacksonville, Ill In 1886 he gave information on American methods of teaching the blind, deaf, and dumb, before a royal commission appointed to investigate and reorganize the system in England His publications include *A Popular Manual of International Law* (1879) and *Life of Thomas Hopkins Gallaudet* (1888), his father

GALLAUDET, THOMAS (1822–1902). An American clergyman and educator of the deaf

and dumb, a son of Thomas Hopkins Gallaudet He was born in Hartford, Conn, and graduated at Trinity College (Hartford) in 1842 In 1843–57 he taught in the New York Institution for the Deaf and Dumb He supported the "combined" system—partly oral, partly sign manual—in teaching deaf-mutes Meanwhile he was ordained a deacon and priest in the Protestant Episcopal church, and in 1852 he organized St Ann's Episcopal Church in New York, where there were services for deaf-mutes In 1872 he organized and became general manager of the Church Mission for the Deaf and Dumb and in 1885 founded the Gallaudet Home for Deaf Mutes at Wappinger's Falls, near Poughkeepsie He became rector emeritus of St Matthew's Episcopal Church and vicar of St Ann's, which since 1897 has been associated with St Matthew's parish and is exclusively a place of worship for deaf-mutes

GALLAUDET, THOMAS HOPKINS (1787–1851) An American educator of the deaf and dumb, born in Philadelphia, Pa, of French Huguenot ancestry He graduated at Yale in 1805, studied theology at Andover Theological Seminary, and was licensed to preach in 1814. Instead of preaching, however, he was sent (by persons in Hartford) to Europe in 1815, to study methods of caring for the deaf and dumb, familiarizing himself with the systems of the Abbé Sicard in Paris, and of Braidwood and Watson in London. In 1817, with Laurent Clerc, a deaf-mute, assistant of Sicard, he opened a school of instruction at Hartford, Conn, called the Connecticut (and later the American) Asylum, of which he continued to act as principal until 1830 In 1832–33 he was professor of education in New York University—the first American professorship of education His sons, Thomas and Edward Miner Gallaudet (qq v), and his wife, were also engaged in work for deaf-mutes He published, in addition to numerous pamphlets *Sermons Preached to an English Congregation in Paris* (1818), *Plan of a Seminary for the Education of Instructors of Youth* (1825), the germ of American normal schools, *Bible Stories for the Young* (1838), *The Child's Book of the Soul* (1850) Several of his devotional works were translated into other languages—modern Greek and Siamese, for instance. Consult Humphrey, *Life* (New York, 1858), and E M Gallaudet (his son), *Life* (ib, 1888) See DEAF-MUTE

GALL BLADDER See LIVER.

GALLE, gal See POINT DE GALLE

GALLE, gal'le, JOHANN GOTTFRIED (1812–1910) A German astronomer, born at Pabsthaus, near Grafenhainichen He studied the mathematical sciences at Berlin, taught for a time in a gymnasium, and was subsequently made assistant observer in the Berlin Observatory, of which Encke was then director He discovered three unexpected comets and was awarded the prize of the French Academy But his principal achievement was the finding of the planet Neptune It was to the Berlin Observatory that Leverrier addressed his request that a search be made for the hypothetical planet, whose place in the sky he had computed from the observed disturbances in the motion of Uranus Galle made the search requested by Leverrier and was the first to see the new planet, Sept 23, 1846 Galle was also perhaps the first astronomer to advocate (1875) the use of planetoid observations for the determination of the solar parallax (see PARALLAX)—a method now considered the best known His researches on this subject were published at Breslau, where he had been made director of the observatory and professor of astronomy in 1851 Galle's published works include *Grundzuge der schlesischen Klimatologie* (Breslau, 1857), *Ueber eine Verbesserung der Planetenelemente* (ib, 1858), *Ueber eine Bestimmung der Sonnenparallaxe aus korrespondierenden Beobachtungen der Flora im Oktober und November 1873* (ib, 1875), *Mitteilungen der Breslauer Sternwarte* (ib, 1879), *Verzeichnis der Elemente der bisher berechneten Kometenbahnen* (Leipzig, 1894) His original contributions were published, for the most part, in scientific periodicals

GALLEGO, ga-lyā'gō, JUAN NICASIO (1777–1853) A Spanish poet, born at Zamora Educated at Salamanca, he took orders in 1800 and became a court chaplain in 1805 On the uprising of 1808 he wrote what is probably his best-known poem, *El dos de mayo*, a stirring patriotic ode In 1810 he was a deputy in the Cortes of Cadiz, holding liberal views This political activity caused his imprisonment after the restoration of Ferdinand VII, but he was liberated by the revolution of 1820 Elected to the Spanish Academy in 1830, he was made perpetual secretary in 1839 His works are few, but hold a high place in the literature of his country on account of their excellent style and intense patriotism The best collection of his poems is in vol lxvii of the *Biblioteca de autores españoles* (Madrid, 1875)

GALLEIN, găl'ē-ĭn See COAL-TAR COLORS

GALLENGA, gal-lĕn'gă, ANTONIO (1810–95), early pseudonym, Luigi Mariotti An Italian historian and publicist, born at Parma He began the study of medicine at the University of Parma, but abandoned it for a literary career After playing a part in the insurrection of 1831, he went into exile and visited France and the United States Returning to Italy, he became prominent in the councils of Mazzini's party and was chosen as the agent to assassinate the King of Sardinia, Charles Albert He could not bring himself to do this and in 1838 withdrew to London In 1843 he was given the chair of Italian literature in University College and three years later became a naturalized British citizen He was in Italy at the uprising of 1848, but left it when the fortunes of the revolutionists sank, to return in 1854, when he was elected a deputy to the Sardinian Parliament The following year his *History of Piedmont* was published in London and aroused such dissensions in Mazzini's party by the statement of facts as to the intended assassination of Charles Albert that he had to resign his place in the Parliament He returned once more to Italy in 1858, entered the Parliament at Turin as a deputy, and in 1874 accompanied King Victor Emmanuel to Berlin and Vienna He was long a correspondent of the London *Times*, both in Italy and in other countries, including America, Denmark, and Spain Among his works are *Oltremonte ed oltremare, conti di un pellegrino* (1844), *Italy, Past and Present* (1846), *Scenes of Italian Life* (1850), *Italy in 1848* (1851), *Two Years of the Eastern Question* (1877), *The Pope and the King* (1878), *L'Italia presente e futura* (1886) His *Practical Grammar of Italian* for the use of English-speaking students has passed through several

editions since 1851 He contributed many articles to English reviews His command of English as well as of Italian was remarkable, and his influence counted for much in establishing the friendly feeling of England for his country

GAL'LEON (from Sp. *galeón*, It *galeone*, augmentative of *galea*, galley) A name formerly applied to ships of war of three or four gun decks, but subsequently transferred to the large merchant vessels which every year brought to Spain the gold, silver, and other wealth contributed by its Mexican and South American colonies They were armed, but, being heavy, unmanageable vessels, and containing cargoes of immense value, were eagerly sought after as prizes whenever a war broke out

GAL'LEOT. See GALLIOT

GAL'LERY (OF *galerie, galerie*, Fl. *galerie*, probably a special use of OF *galerie, galerie*, mirth, from *gale*, festivity, from AS *gāl*, OHG, Ger *geil*, wanton) A word with several applications in architecture (1) a long open structure in the upper part of a building, whether projecting or not, inside or outside, (2) a long passage, corridor, or hall connecting or flanked by other apartments, (3) a large, well-lighted hall in a museum, especially one for works of art, (4) a large structure, comprising one or more streets or alleys roofed with glass and flanked by shops Of class (1) interesting examples are the famous outside façade galleries on French Gothic cathedrals, such as the *galerie des rois* at Rheims, Amiens, and Paris, usually serving as a practical passageway, the interior galleries in so many mediæval churches, termed triforium galleries, the projecting rood lofts, or singing galleries extending across the inside façade, and the projecting galleries in many modern churches, theatres, opera houses, etc The arrangement of galleries in tiers one over the other, now so much used in churches, theatres, etc, is entirely modern, dating from the seventeenth century. Of class (2) early and most interesting instances are the low and richly paneled gallery halls of the old châteaux and manor houses, especially in English mansions of the sixteenth and seventeenth centuries, where family portraits and collections of arms, armor, furniture, and bric-a-brac were kept, to it also belong such galleries as that which connects the Sainte Chapelle and the Palais de Justice in Paris, and the long gallery connecting the Pitti Palace and the Palazzo Vecchio at Florence. Class (3) is related to the château gallery, being a hall for public instead of private exhibition, and the name is often applied to an entire building containing several exhibition galleries We are familiar with the Uffizi, Borghese, Louvre, National, and other such galleries Finally, to class (4) belong the very modern and colossal glass-roofed galleries at Naples and Milan and those of the Palais Royal at Paris, of Brussels and of some of the German cities, which are in reality streets roofed with glass Some galleries can hardly be classified, such as the famous Gallery of Mirrors at Versailles. See GALERIE DES GLACES

GALLERY. In military fortifications, a covered passage, cut through the earth or masonry in the defenses, whereby effective musketry fire can be directed through loopholes. Galleries have been occasionally used in the counterscarps of dry ditches enabling the defenders to maintain a flanking fire upon the ditch They are also used in the construction of military mines and form an important part of fortresses like Gibraltar, where there are galleries of communication and connection In military mining *underground communications* are classed according to their directions as *galleries*, which are horizontal or nearly so, and *shafts*, which are vertical or nearly so Galleries are classed, according to their size, as *great* or *grand galleries*, which are 6 feet high by 7 feet wide, *common galleries*, 6 × 3½ feet, *half galleries*, 4½ × 3 feet, *branches*, 3½ × 2½ feet, and *small branches*, 2½ × 2 feet See FORTIFICATION MINES AND MINING, MILITARY

GAL'LEY (OF *galee, galie*, It *galea*, from ML *galea, galeia*, MGk γαλέα, *galea*, γαλαία, *galaia*, galley) The name generally applied to vessels using sails and oars The ships of the ancients were practically all of this character, hence they are generally spoken of as galleys A bas-relief at Thebes represents a naval victory gained by the Egyptians over the East Indians about 1400 B C The vessels shown have oars and sails, and the Egyptians had figureheads of metal in the shape of a lion's head Herodotus says that the Egyptian war galleys had soldiers on board as the fighting force, archers and sling men being stationed on the raised platforms at bow and stern, while pikes, spears, javelins, battle-axes, falchions, swords, and other weapons were kept in convenient places for use in boarding or repelling boarders The sail was square and carried on a yard on the single mast The Egyptians never were such bold navigators as the Phœnicians, and their vessels were probably inferior in seagoing qualities to the Phœnician ships After having been for centuries masters of the seas, the Phœnicians became subject to Egypt, and in 610 B C, by order of the Egyptian King, Necho, a Phœnician expedition is said to have circumnavigated Africa The advantages possessed by a war vessel propelled by oars over one at the mercy of the winds was early realized, and to attain the greatest possible speed the number of banks of oars was increased to two, three, four, and five The increase beyond three seems to have resulted in very little gain, and the *trireme* remained for many centuries the standard type of war galley of the first class In merchant galleys sails formed the principal motive device, and oars were auxiliary, in war galleys the reverse was the case

The more modern galley appeared after sail power had begun to assert its supremacy as the propelling force of seagoing vessels Its development reached its highest point at the end of the sixteenth century, Lepanto being the last great sea fight in which the galley appeared as the most powerful type of war ship These vessels carried firearms, guns, and small arms, and had fairly good sail power as well as oars During the Middle Ages the oars of galleys were largely manned by infidel prisoners and criminals, and in France convicts were used in the large boats working about the arsenals until recent times Row galleys, fitted as gunboats, were extensively used during the Napoleonic wars in operations and caused much trouble to the British fleet Like all galleys designed especially for oar propulsion, they were long and narrow, the length being seven or eight times the beam, and they were therefore very fast In the British navy the term "galley" is applied to the captain's boat, or gig, and

other similar boats built for speed under oars For further information consult Rawlinson, *Ancient Monarchies* (3 vols, New York, 1900), Parker, *Fleets of the World The Galley Period* (ib, 1877), Jal, *Archeologie navale* (Paris, 1840), Bouet-Willaumez, *Batailles de terre et de mer* (Paris, 1855), Torr, *Ancient Ships* (Cambridge, 1895), Holmes, *Ancient and Modern Ships* (2 vols, London, 1906), Chatterton, *Ships and Ways of Other Days* (Philadelphia, 1913) See SHIP

GALLEY SLAVE See BAGNES

GALLEY WORM See CENTIPEDE

GALL GNAT A minute fly of the family Cecidomyiidæ, which makes galls (q v) on plants See GALL INSECTS

GAL'LI A name given to the eunuch priests of Cybele (q v) See also ATTIS

GAL'LIA, or GALLIA TRANSALPINA, găl'ĭ-a trăns'ăl-pī'na The name given by the Romans to a part of western Europe which is in the main identical with modern France For the district as a whole and for its various divisions, Gallia Belgica, Gallia Braccata, Gallia Lugdunensis, Gallia Narbonensis, Gallia Provincia, see GAUL

GALLIA CISALPINA, găl'ĭ-a sĭs'ăl-pī'nâ See GAUL.

GALLIARD, gâ'yar' (Fr, merry) An old French dance for two dancers It was of a stately character, written in three-quarter time, and was one of the precursors of the minuet

GALLIA TOGA'TA See GAUL

GAL'LIC ACID (from Lat *galla*, gallnut), $C_6H_2(OH)_3COOH$ An organic acid that exists ready-formed in small quantity in gallnuts, in Chinese tea, in valonia (the acorn cup of *Quercus agilops*), in divi-divi (the pod of *Cæsalpina coriaria*), in sumac, and in other vegetable products It is formed from tannin when the latter is boiled with dilute sulphuric or hydrochloric acid, or, much more slowly, when gallnuts, reduced to a thin paste with water, are mixed with a little yeast and exposed to the air until a cover of mold is formed, the gallic acid separates out in the free state and is purified by recrystallization from boiling water Gallic acid has also been prepared artificially by chemical methods Pure gallic acid is a colorless substance, crystallizing in the form of silky needles that are slightly soluble in cold water, but require only three parts of hot water for their solution, and are also freely soluble in alcohol and in ether When heated to the temperature of 220° C, gallic acid melts and decomposes into pyrogallic and carbonic acids, the reaction taking place according to the following chemical equation

$$\underset{\text{Gallic acid}}{C_6H_2(OH)_3COOH} = \underset{\text{Pyrogallic acid}}{C_6H_3(OH)_3} + \underset{\text{Carbonic acid}}{CO_2}$$

Solutions of gallic acid have an acid reaction and a sour, astringent taste, iron salts impart to them a blue-black color, and therefore gallic acid has been employed in the manufacture of ink Further, as the acid possesses the property of reducing the salts of gold, silver, and platinum, it has been extensively employed in developing photographs Gallic acid is also sometimes used in medicine, and finally, since solutions of its alkali salts rapidly absorb oxygen, the acid may be usefully employed in the chemical laboratory

GAL'LICAN CHURCH The national church of France The term is frequently used, however, not so much in its historical or geographical sense as in the narrower signification attached to the word "Gallicanism"—a school of thought which asserts certain principles of more or less independent church government and prerogatives in administration claimed by the national church as opposed to certain rights of the Pope The fact that France was the "eldest daughter of the Church," one of the countries in which the Christian faith became widely diffused even in the lifetime of the Apostles, gave the adherents of this view a powerful tradition of Church privileges to which they might appeal Christianity flourished very early among the Greek colonies in the south of Gaul, as the old tradition of the visit of Lazarus to this region attests In the numerous and populous towns along the Rhône and its tributaries, there arose important congregations professing Christianity When persecution came, the Gallic Christians had their full share of hardships They were closely in touch with those who shared the same faith in other parts of the world, and one of the most touching monuments of early Christian literature is the letter of the churches of Lyons and Vienne to the brethren in Asia concerning the martyrs of these churches, which Eusebius has preserved in his *Ecclesiastical History* The works of Irenæus, Bishop of Lyons (died c 202), are important contributions to the history of Christian doctrine In the next two centuries Sulpicius Severus, Hilary of Poitiers, Hilary of Arles, Vincent of Lérins, Prosper, Victor, Eucherius, Salvian, and Gregory of Tours continued a tradition of great churchmen, of which Gaul was not without reason proud The hierarchical organization of the Church of Gaul was from the earliest times the most complete and regular of all Western Christendom As a result of this tradition of zeal and faith, many privileges were granted to it, and later on, the kings of France began to make themselves felt more and more in ecclesiastical affairs This was an almost inevitable consequence of the close relations between the crown and the Church dignitaries, most of whom held the temporalities of their benefices by the ordinary feudal tenure, the royal authority soon came to assert a correlative claim to certain privileges in ecclesiastical matters There were not wanting ecclesiastics who would compound with their consciences in order to uphold the claims of their sovereign, and for several centuries after the death of Charlemagne kings and bishops at times played into each other's hands

In order to secure subservient ecclesiastics, monarchs insisted on the privilege of nominating to bishoprics The wealth of the more prominent sees was very great, and rulers contrived at times to have their brothers, or even illegitimate relatives, nominated to them Where such unworthy prelates ruled their flocks without due regard to Church principles, the only resort was an appeal to Rome, and that usually took a considerable time, during which abuses seemed to acquire the force of right As the result of these appeals and their not infrequent decision against the wish of the King, there came a protest against having such causes decided outside the realm More than one of the French sovereigns engaged in a conflict with the Roman see, and these conflicts naturally called out a division of opinion among the mem-

bers of the Church of France, one party supporting the papal claims, while the other maintained the alleged prerogatives of the French crown and privileges of the national church The great contest between Philip the Fair and Boniface VIII was a turning point in the constitutional history of Europe—the beginning of a reaction on the part of the laity against ecclesiastical predominance, which, like most reactions, went further in the opposite direction, and the state succeeded in transferring to itself the greater part of the external dominion enjoyed previously by the hierarchy

Gradually the principles of what is known as Gallicanism took definite shape, even thus early. Throughout its long career, while recognizing in theory the primacy by divine right of the Roman pontiff over the whole Church, it yet asserted the independence of national churches, and especially that of France in many details of local government, and held the exercise of papal prerogative to be limited by the canons and decrees of general councils It must be added that while the Gallican theory to this extent claims an exemption from dependence upon the authority of the Pope, it acquiesces, on the other hand, to an almost proportionate degree in the assumption of ecclesiastical authority by the civil government, indeed, in many of the details of its later development it falls into the extremest form of Erastianism, the doctrine of state supremacy in matters spiritual as well as temporal The conflicting claims of the rival popes in the Western schism (see SCHISM, WESTERN) tended to weaken the papal authority, especially in France The expedient adopted of calling a general council to pronounce upon the respective claims of the rival popes gave prominence to what became one of the leading tenets of Gallicanism, the superiority in point of authority of a general council to the Pope

Some of the disciplinary enactments of the councils of Constance (1414–18) and Basel (1431–45) were mainly directed towards the limitation of the papal authority in the exercise of Church patronage within the limits of the national church These claims of privilege culminated in the Pragmatic Sanction (q v), passed at Bourges in 1438 by a national council of the French church in union with the King, Charles VII This abolished papal reservations and restricted appeals to Rome to *causæ maiores*. Though Louis XI attempted to repeal it, it was maintained in spite of papal protests until 1516, when it was superseded by the Concordat of Bologna (see CONCORDAT) between Leo X and Francis I The most conspicuous alteration effected by the new compromise was the transfer of the right of nomination to bishoprics and other *bénéfices consistoriaux* from the capitular bodies to the crown, with a provision for papal veto upon any choice which did not satisfy canonical requirements It was substantially a triumph of the absolutist principle, as represented by the King and the Pope, over the constitutional, as embodied in the "Gallican liberties", the upholders of the latter quoted it complacently as establishing them, whereas it was the most formidable blow which had been dealt at them

Soon, however, new and more far-reaching complications arose with the introduction of the principles of the Reformation into France The first Protestant place of worship in Paris was opened in 1555, at which time the adherents of the Reformation in the kingdom probably numbered about a million and a half Beginning as dissenters on spiritual grounds, the Huguenots were soon driven by the force of circumstances into the position of a seditious faction whose activity threatened the peace and stability of the state Their history cannot be properly understood unless this fact is borne in mind The story of the wars of religion is strangely complicated by its bearing upon their progress. Thus, the League, which took its rise from the strangely indulgent terms granted to the Huguenots by the "Peace of Monsieur" in April, 1576, four years after the Massacre of St Bartholomew (see BARTHOLOMEW, MASSACRE OF SAINT), was founded upon peculiarly assorted principles, politically it was democratic, while its religious views were the most ultramontane At the time of its predominance, after the "day of the barricades" (May 12, 1588), the Huguenots became for a time the champions of order and constitutional authority, but the situation changed again with the conversion of Henry IV That sovereign, when he issued the Edict of Nantes in 1598, was actuated not only by a general belief in toleration, but by his knowledge that French Protestantism was a struggle even more for political than for religious predominance, and his desire to bring that conflict to an end, in the interests of statesmanship, by depriving his Protestant subjects of any reasonable pretext for disaffection

With the cessation of civil strife, a remarkable outburst of religious life manifested itself There was need for it, three-fourths of the parochial churches and a third of the episcopal sees were without pastors, and miserable disorder was to be seen everywhere Now, in all directions, new undertakings multiplied—colleges, schools, hospitals, congregations for the systematic training of the clergy, seminaries, and new monastic orders or reforms within the old ones. The names of St Vincent de Paul, of St Francis de Sales, and his devoted associate, St Jane Frances de Chantal, of Cardinal de Bérulle, and M Olier, of La Trappe and Saint-Maur and Port Royal, speak eloquently of the great wave of zeal which passed over the land in the first half of the seventeenth century When, however, the death of Richelieu removed the great personality which had stood for order and unity, this fair picture was marred by a new ebullition of strife, which proved full of peril and disaster, in the rise of Jansenism and Quietism (qq v). Towards the close of the century, moreover, with the attempt of Louis XIV to enlarge the ecclesiastical prerogative of the crown as he had increased its political authority, the principles of Gallicanism assumed an importance which may fitly be treated here at length Controversy arose over his attempt to enforce the so-called *droit de régale*, based upon his claim to receive the revenues of bishoprics during vacancies, and to appoint to all benefices in the Bishop's patronage, not involving the cure of souls, which might fall vacant during the interval An effort to exercise this power brought on a collision between the crown and certain bishops Their metropolitan decided against them, and they appealed to Rome, where Innocent XI upheld them, much to the displeasure of Louis and the courtier ecclesiastics An assembly of the higher French clergy was convened to find a way out of the difficulty At its opening Bossuet, just chosen Bishop of

Meaux, delivered his celebrated discourse on the unity of the Church It was clear that his intention was not to deny the headship of Rome in any sense, but merely to reassert what were considered prescriptive privileges, yet it is difficult to understand how the prelate who pronounced so eloquent a defense of the rights of the Pope could, before the end of the assembly, have signed the Gallican articles

These articles, four in number, are considered the charter of the Gallican church The first declares that "the jurisdiction of St Peter and his successors in the Roman see as vicars of Christ on earth, although divinely bestowed, is confined to things spiritual, and does not extend to civil or temporal affairs" The second renews the declaration of the Council of Constance as to the superiority of a general council to the Pope, and declares that the articles passed in the third and fourth sessions of the council are not to be restricted in their application to a period of schism such as existed at the time of the council The third asserts that the authority of the Pope is to be restricted by the canons of the universal Church, and that "the laws, customs, and constitutions of the realm and of the Gallican church remain in full force" The fourth declares that "the Pope has the principal share in the decision of questions of faith, his decrees regard all the churches and each church in particular, nevertheless, his judgment is not irreformable unless the consent of the entire Church be added to it" It has been pointed out that since the Vatican Council, adherence to this last proposition would amount, for Roman Catholics, to formal heresy. The chief laws and customs referred to in the third article are that the national church of France is not bound to receive all the decrees of councils and of popes in matters of discipline, and that only such decrees as are formally received are in force in France, that the Gallican church holds itself free to receive or reject the rules of the Roman chancery, that the Roman pontiff cannot levy any impost upon the French clergy without their consent, that he cannot bestow of his own motion on a foreigner any benefice properly belonging to the Gallican church, that neither the Pope himself nor his legates can hear French causes "in the first instance," and that even in cases of appeal he is bound to assign French judges to hear the cause, even should the appellant be a metropolitan or primate, finally, it is asserted that the French bishops shall not be required to attend any general council, unless with the permission of the crown The last of these customs, as also those which make the reception of the general canons of discipline optional in France, and which practically throw the decision into the hands of the civil power, have been not unreasonably called the "slaveries" rather than the "liberties" of the Gallican church It was not long before Bossuet declared that "the liberties of the Church are constantly appealed to against the Church and to her detriment" Fénelon wrote "In practice the King of France is now more the head of the Church than the Pope Liberty towards the Pope, servitude towards the King The King's power over the Church has fallen into the hands of the civil tribunal Laymen lord it over the bishops Secular judges go so far as to examine even those papal bulls which relate only to matters of faith"

Louis was resolved, nevertheless, to enforce the declarations absolutely By royal edict he commanded the acceptance of the four articles and their incorporation into the acts of parliaments and universities Professors were required to teach them and bishops to swear to them The Sorbonne objected, but was compelled to submit Outside of France, distinct disapproval marked the declaration, Pope Innocent XI received it in silence, but refused to raise to the episcopate any members of the assembly who were subsequently nominated His successor, Alexander VIII, condemned the declaration in 1690 Two years later Louis wrote to Innocent XII that his edict concerning the Declaration of Rights no longer held, and that he wished all the world to recognize his veneration for the Pope The declaration was not, however, formally withdrawn and was subsequently condemned by Clement XI in 1706, and again by Pius VI in 1794

The revocation of the Edict of Nantes scarcely belongs in strictness to an ecclesiastical survey, since, like the original promulgation, it was supposed to be an act of political wisdom The Huguenots, as Lavalée remarks, preserved towards the government the attitude of children in disgrace, and towards the Catholics that of disdainful enemies, they persisted in their isolation, they kept up a continual correspondence with their friends in England and Holland, even when those countries were hostile to their own. "France," says Michelet, "found a Holland in its own bosom which was rejoicing at the success of the other." On the eve of the formation of the League of Augsburg against him, Louis XIV could hardly have been expected to leave such a stronghold of anarchy within his kingdom as the privileges of the Edict of Nantes had come to constitute The act of revocation was received with a chorus of enthusiastic applause from all sorts of people in France Bossuet burst forth into a joyful panegyric, Fénelon, who has been represented as the apostle of toleration, laid it down clearly that "though no sovereign may require interior belief in religious matters from his subjects, he may prevent the public exercise, or the profession, of opinions or ceremonies which disturb the peace of the commonwealth, by the diversity and multiplicity of sects" The laity applauded the King not less than the clergy, the great Chancellor, Le Tellier, after a life of noble and high-minded service to his country, died with the *Nunc dimittis* upon his lips, saying that he had nothing left to wish for after this final act of his long ministry The consequences to religion were not, however, altogether happy, and the gentle methods of persuasion employed by the Lazarists, Sulpicians, Doctrinaires, and Theatins, who went as missionaries among the Huguenots, were probably far more efficacious in producing real conversions than were the *dragonnades*

The general tone of laxity which characterized the eighteenth century did not fail to have its effect upon the Church, infecting at least the higher clergy with a spirit of worldliness and selfish devotion to ease and pleasure A terrible punishment came upon them in the Revolution The Constituent Assembly first laid hands upon the property of the Church to meet its financial needs, and then assumed to tamper with her organic structure The "Civil Constitution of the Clergy," decreed on July 12, 1790, was but a natural outcome of Gallican principles, yet

its arbitrary suppression of dioceses and establishment of others, its provision for the election of bishops and *curés* by the people and their payment by the state, whose stipendiaries they were to become, raised the weightier question as to whether, after all, the civil power was to impose laws upon the spiritual without the concurrence of its legitimate rulers From this time Gallicanism, as a system, has steadily declined, and while it is true that French bishops in the nineteenth century were, as a rule, less ultramontane than others, they seem to have learned the necessity for the supremacy of the head of their church in religious matters

The attempt of the Constituent Assembly to separate the French church from Rome and to make it a mere department of the newly organized state, brought about a condition very like a schism Those who submitted to take the oath to support the new order—the Constitutional clergy, as they were called—were regarded by the stricter Catholics as having forfeited their rights, and in the more conservative provinces, like Brittany, the people refused to attend their ministrations On the other hand, those who refused the oath were subjected to increasingly heavy penalties by the revolutionary government and either exiled as a last resort to the pestilential swamps of Guiana or executed. Their faithfulness, however, had its reward, when religion once more held up its head after the excesses of the Terror, the Constitutional organization gradually disappeared, and a *modus vivendi* was reached in the Concordat of 1801 by Napoleon, who was acute enough to see the advantage to his newly founded dynasty of the support of the Church This, having proved not entirely satisfactory, was reviewed after the Restoration, in 1817, but the new instrument, which was in many particulars a return to that of 1516, was not approved by the Chambers, and the Church remained for several years uneasily fluctuating between two concordats, neither of which was fully executed, until in 1822 an arrangement was concluded by which 30 prelates were added to the existing hierarchy, its total number being thus fixed at eighty.

Among questions or movements of general significance which have agitated the French church since that date must be mentioned the stir caused about 1830 by the body of enthusiastic visionaries, of whom Lamennais, Lacordaire, and Montalembert are the best known, starting from a pure devotion to the cause of liberty and a conviction that the Church would gain by its fullest exercise, but ending in dangerous errors which received the condemnation of the holy see In recent years the very serious aggressions made upon the Church with increasing bitterness by the government of the Third Republic have created a new order of affairs Though Pope Leo XIII repeatedly laid down the principle that there is no reason why, theoretically, a good Catholic should not be a good republican, it is undeniable that the bulk of the monarchist parties is composed of members of the Church, and thus politics has become mixed up in the treatment accorded the Church by the government The antagonism finally led to the suppression of the religious congregations in France and the confiscation of their property, a measure difficult to reconcile with the principles of democratic government This was followed by the repeal of the Concordat, the agreement under which the papacy and the French government have carried on their relations since the time of Napoleon Thus, for the first time in modern history, church and state are absolutely separated in France See FRANCE, *History*

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GALLICAN CONFESSION See GALLICAN CHURCH

GALLICO, gal'lē-kō, PAOLO (1868–). An American pianist, born at Trieste, Austria He studied under Julius Epstein at the Vienna Conservatory, where he graduated in 1886 after having won two first prizes for piano playing The next few years he spent on concert tours through Austria, Italy, Germany, Holland, and Russia. In 1892 he came to the United States and settled in New York as a teacher He frequently appeared in recitals and as soloist with the larger orchestras, at the same time being in great demand because of his fine qualities as an ensemble player He published some meritorious songs and pieces for piano

GALLIEN, gal'lēn, JOHANNA See WYTTENBACH, DANIEL ALBERT

GALLIENI, gal'ye-nē', JOSEPH SIMON (1849–1916) A French soldier and colonial administrator, born at Saint-Béat (Haute-Garonne) He graduated from the military school of Saint-Cyr in 1870, fought in the war with Germany, and in 1878 went as captain to Senegambia, where he was active in extending the French influence In 1883–86 he served in Martinique, in 1886 he became Governor of Upper Senegal, and in 1893–95 he commanded a division in Tongking, where he succeeded in extirpating the prevailing brigandism In 1896–1905 he was Governor-General of Madagascar and established French control there He was created general of division on his return to France, and for several years was military governor of Lyons. For his part in the war in 1914 see WAR IN EUROPE He wrote *Mission d'exploration du Haut-Niger* (1885), *Deux campagnes au Sudan français* (1891), *Trois colonnes au Tonkin, 1894–95* (1889), *Rapport d'ensemble sur la situation générale de Madagascar* (1899), *Neuf ans à Madagascar* (1908)

GALLIENUS, găl'lĭ-ē'nŭs, ARCH OF. An

arch on the Esquiline Hill at Rome, erected in honor of Gallienus and his wife Salonina One span of the arch is still standing Consult Platner, *The Topography and Monuments of Ancient Rome* (2d ed, Boston, 1911)

GALLIENUS, PUBLIUS LICINIUS (?–268 AD) Roman Emperor, 253–268 AD He was made joint ruler on the accession of his father, Valerian (q v), in August, 253 In 256 he took the field against the Alemanni, who were making incursions into the Roman provinces along the Danube After several campaigns they were subdued in 258, but they rose again soon after and forced their way into Italy, where Gallienus gained a victory over them near Milan (See ALEMANNI.) Meanwhile Valerian had been engaged in wars with Shapur, or Sapor, the Persian King, by whom he was taken prisoner in 260 Gallienus now became sole Emperor, but only in name, for self-appointed rulers arose in all parts of the Empire, this period being for that reason known in history as the "Reign of the Thirty Tyrants" Gaul became practically a separate kingdom under Postumus (258–267). The reign of Gallienus was a period of incessant turmoil until, in an attack on Milan, where he was besieging the usurper Aureolus, he was killed in a plot formed by some of his own officers

GALLIFFET, ga'lē'fā', GASTON ALEXANDRE AUGUSTE, MARQUIS DE (1830–1909) A French soldier, born in Paris He entered the army in 1848 and fought in the Crimean War He was engaged in Mexico, was wounded at the battle of Puebla, and in recognition of his bravery was selected to deliver the captured Mexican battle flags to Napoleon III During the Franco-German War he led the memorable cavalry charge of the *chasseurs d'Afrique* at the battle of Sedan, and afterward he acted with ability and severity in the suppression of the Commune—indeed, his execution of the Communards was the theme, his life through, of bitter political attacks upon him In 1872–73 he was in Algeria, where he suppressed the revolt among the natives. In 1875 he became general of division, avowed himself a loyal Republican, and won the favor of Gambetta In 1879 he was appointed commander of the Ninth Army Corps He repeatedly conducted the French cavalry manœuvres and was justly famed for his knowledge of this branch of the service The reorganization of the French cavalry in 1882 was largely his work In June, 1899, he was appointed Minister of War, which position he resigned in May, 1900, after having done much by his rigorous discipline to carry the government safely through the crisis of the Dreyfus agitation

GALLI'NÆ (Lat nom. pl, hens), or GALLIFORMES, or formerly RASORES An order of birds, containing at once the most important species domesticated as poultry and those most sought after as game The common domestic fowl may be regarded as the type of the order Like it, the Gallinæ in general have a small head, a rather short bill, with the upper mandible a little arched, nostrils placed on the sides of the bill, and usually in a soft membranous space at its base, the figure bulky, the wings short, and not governed by powerful muscles or adapted for a long or rapid flight, the feet with three toes before and one behind, adapted for walking on the ground and for scraping, which is much resorted to, in order to procure food and for other purposes, the digestive organs complex, the crop large, the gizzard very muscular, the intestine long, with two very large cæca The sternum is deeply double-notched, there are two carotids, the oil gland is tufted, the plumage has aftershafts, and there are usually more than 12 tail feathers The head, at least of the males, is often furnished with appendages, as a crest, comb, wattles, etc The legs of the males are also often furnished with spurs, and at least during the breeding season the males are very quarrelsome The males of many species (e g, pheasants) are birds of splendid plumage, that of the females is sober, but females of very advanced age sometimes assume a plumage similar to that of the males Some of the Gallinæ are polygamous, some pair at the breeding season, the nest of all of them is artless, and the males take no part in incubation, and only occasionally aid in the rearing of the young The young are precocial, i e, they are comparatively feathered when hatched and are immediately able to run about and pick up food for themselves, but are for some time tended and protected by the mother, and by her the proper food is sought for them and pointed out to them or broken into sufficiently small pieces and laid before them The Gallinæ have unmelodious voices Except the curassows, they make their nests on the ground Some of them are found in almost all parts of the world The order contains seven families, Megapodiidæ (see BRUSH TURKEY, MOUND BIRD), Cracidæ (see CURASSOW, GUAN), Tetraonidæ (see GROUSE, PTARMIGAN), Phasianidæ (see PARTRIDGE, QUAIL, PHEASANT, TRAGOPAN, JUNGLE FOWL, PEACOCK), Numididæ (see GUINEA FOWL), Meleagridæ (see TURKEY), Odontophoridæ (see QUAIL, PARTRIDGE).

GAL'LINE'TA (Sp, sandpiper) A remarkable rail (*Aramides ypecaha*) of the La Plata valley, South America, called "ypecaha" by the native Indians, which is noted for its shrieking cries, and for its gathering into companies which join in dances, the performers becoming almost frenzied with excitement, and with loud cries and outstretched wings rushing from side to side for several minutes These performances are indulged in by jacanas, the Cayenne lapwing, and various birds in other parts of the world For a detailed description and consideration of this and other habits, consult Hudson, *Naturalist on the La Plata* (London, 1892)

GAL'LINGER, JACOB H(AROLD) (1837–1918) An American physician and Republican politician, born at Cornwall, Ontario, Canada He became a printer in his teens, studied medicine in Cincinnati, practiced medicine and surgery at Concord, N H, from 1862 until his appearance in public life, and contributed much to medical literature In 1879–80 he was surgeon-general of New Hampshire, with rank of brigadier general He was a member of the New Hampshire House of Representatives in 1872–73, of the State Constitutional Convention of 1877, of the State Senate in 1878, 1879, and 1880, and again of the House in 1891. From 1882 until his resignation in 1890 he was chairman of the Republican State Committee and in 1898 and 1900 was reelected to the post He was chairman of the New Hampshire delegation to the Republican National Convention of 1888, in which he seconded the nomination of Benjamin Harrison for the presidency, and also chairman of the delegation to the convention of 1900 In 1885

he entered the Forty-ninth Congress He was reelected in the Fiftieth, declined renomination for the Fifty-first, took his seat in the Senate in 1891, and was reelected in 1897, 1903, and 1909 In December, 1912, he and Senator Bacon of Georgia, were chosen alternating presidents of the Senate He belonged to the conservative wing of the Republican party, being a "standpatter," particularly on the tariff question

GALL INSECTS (from Lat *galla*, gallnut) Until about 200 years ago galls were supposed to be purely of vegetable origin, and the maggots that grow within them were supposed to arise by spontaneous generation in the organic substances in the galls Pliny knew that a fly came from galls and thought they grew like fungi in the night Malpighi, in the second half of the seventeenth century, was the first to record the fact that the production of galls followed puncture of vegetable tissue by insects, and he came to the conclusion that the insects inject a substance, which he called ichor, into the plant tissue, and this substance produced a swelling similar to that which the sting of a bee causes in animal tissue Réaumur held the theory that the gall is not the product of some specific irritating fluid, but is due to the irritation caused by the prick, and to the presence of the egg and developing larvæ in the tissue. Some galls begin to develop as soon as the eggs are laid, but, unfortunately for the universal application of Réaumur's theory, others do not begin to develop until after the eggs hatch, which may be months after they are deposited in the tissue

Galls occur on a great many kinds of plants and are produced by a variety of insects, by mites, and by certain species of nematode worms Each species of insect confines its activities to one or, at the very most, to a very limited number of species of plants The same kind of insect will produce different kinds of galls on different kinds of plants, and different kinds of insects will produce different kinds of galls on the same plant Each species of gall insect, however, infests a particular part of the plant, such as the leaf, flower, stem, or root, and that part alone, and it produces there galls with such precise qualities that it can be definitely stated, from the appearance of the gall, what sort of insect has caused its development. In rearing galls one cannot be certain, from merely observing the emerging insects, what species are the producers of the gall, for a number of different kinds of insects may develop within the same gall—some as guests, feeding on the tissue of the gall, and others as parasites on the larvæ of the true gall insect

Nearly all the orders of insects have gall-making representatives In addition there are the galls of mites and nematodes The galls made by mites, like those produced by plant lice, have open mouths for the escape of the matured mites An example of a gall produced by mites is the pear-leaf blister made by *Phytoptus pyri* Nematodes of the genus *Angullula*, which is allied to the vinegar worm, are the cause of smut in growing grain, particularly in wheat The larvæ of these insects have the most extraordinary capacity of withstanding desiccation The egg is laid by the parent in the growing ear, where the larvæ develop and are set free by the dying grain. They then live in the moist earth until the young wheat begins to grow They creep up the stem of the wheat, and when once lodged within the head they soon gain sexual maturity In their wanderings in search of new, growing grain the larvæ undergo great vicissitudes They may be compelled by drought to encyst a number of times, even on the very stem of the plant, and await moisture before they are able to reach their final destination According to Spallanzani, they may retain their vitality for 20 years while awaiting their food plant

The family Cynipidæ, of the order Hymenoptera, furnishes the greatest number of species of gall-producing insects The majority of its species (called gallflies) infest some part of the oak, making closed galls They are the best studied of all the galls, and a large amount of information concerning their life history has been gained by the painstaking studies of Adler, Riley, and others Adler kept oak saplings until from four to six years old, and on these he isolated certain insects and observed the resulting galls. Some of the species that Adler bred were so nearly alike that he could determine them with certainty only by their galls Moreover, certain species that had been given different specific or even generic names he found to be the alternating generations of other described species Some winged generations he found to be composed entirely of females, and the next generation of both males and females Thus, the individuals of one generation do not resemble their parents, but their grandparents (See ALTERNATION OF GENERATIONS) Not only are the insects of these two generations very different, but the galls that they produce are likewise different Other forms are believed to reproduce entirely parthenogenetically without males ever appearing Adler studied galls of the bud, leaf, bark, and root, and found that all of them are developed by abnormal activities of the cambium ring The potentialities of the tissue growth are always present at the spot pricked and are merely called into activity by the prick or by the larvæ He found that some of the galls are protected from attack by sweet juices, which attract guarding ants, and it is interesting to note that the honey-making ants (q v) of the southwestern United States gather honey from oak galls Other galls are provided with a sticky secretion on long hairs which entraps marauders, the spongy parenchyma of some galls is so very thick that it acts as an effectual barrier against intruders Other galls have an inner stony layer for the protection of the larvæ, others, a large, hollow chamber in which it is difficult for the enemy from without to locate the larvæ The pine-cone-like arrangement of scales in certain galls is a sufficient protection to the larvæ Other galls are exempt from attack by virtue of their bitter tannin or by their protective coloration Insects, titmice, pheasants, and squirrels are the chief enemies of gall insects, the birds and squirrels tearing them open in winter to get the larvæ within them

Three classes of hymenopterous insects may be reared from one and the same gall 1 Psenids, or true gallflies, which lay their eggs in the tissue of the plant, many of these species cause those subsequent modifications in the development of the plant tissue that we call galls 2 Inquilines, or guests, which lay their eggs and develop in the galls caused by the true gall makers 3 Parasites, which prey on the larvæ of the true gall makers or their guests Accord-

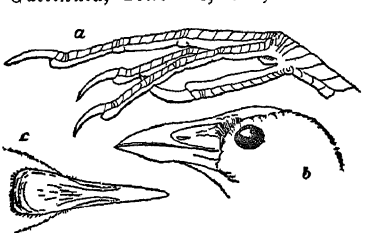
ing to Adler, Riley, and others, the growth of the gall probably depends upon the activity of the larvæ and is the result of some secretion or excretion thrown out by the larvæ

The rate of growth of the gall will depend on that of the meristem—those that are formed on catkins and young leaves growing rapidly, while those on roots and bark require perhaps months to gain full size

Some of the gall larvæ of the Diptera (especially the minute flies of the family Cecidomyiidæ) transform in the plant tissue and others in the ground The larvæ are maggot-like and without anal opening The goldenrod gall, a round ball produced in the stem of the plant by a fly (*Trypeta solidaginis*), and the pine-cone galls on the heart-leaved willow (*Salix cordata*) are formed by dipterous insects The Hessian fly of wheat, which stings the base of the leaf, and the wheat midge, which stings the flower, are also classed as gall insects The Hemiptera have gall-producing representatives among the plant lice (aphids) of the Coccidæ and of Phylloxera The galls produced by plant lice have open mouths for the escape of the developed lice Reproduction may take place within the gall The cockscomb elm galls, on the upper side of elm leaves, are produced by the plant louse (*Colopha ulmicola*) The destructive grapevine phylloxera makes galls on the underside of the grape leaf and on the roots of the vine The elongated galls on the goldenrod stems are produced by a tineid moth (*Gelechia gallæsolidaginis*) In Australia several plants are infested by gall-producing thrips, and galls are also said to be caused by beetles

Consult Osten-Sacken, "On the Cynipidæ of North American Oaks and their Galls," in *Proceedings of the Entomological Society of Philadelphia*, vol i, pp 47–72, 241–259, vol ii, pp 33–49, vol iv, pp. 331–380 (Philadelphia, 1861–64), Cameron, *Monograph of the British Phytophagous Hymenoptera* (London, 1882–93), Rothama, "On the Ætiology and Life History of Some Vegetal Galls," in *Natural Science*, vol iii (ib, 1893), Beutenmuller, "Catalogue of Gall-Producing Insects Found within Fifty Miles of New York," in *Bulletin of the American Museum of Natural History*, vol iv (New York, 1892), id, The Insect-Galls of the Vicinity of New York City," in *American Museum Journal*, vol iv (ib, 1904). See PHYLLOXERA, APHID, GALLS

GAL'LINULE (Lat *gallinula*, dim. of *gallina*, hen) A bird of one or other of the genera *Gallinula*, *Ionornis*, etc, of the family



HEAD AND FOOT OF GALLINULE

a, foot of purple gallinule (*Ionornis martinicus*), *b*, profile of head of the same, *c*, top of head of Florida gallinule (*Gallinula galeata*), showing shape and extent of frontal shield

Rallidæ, closely allied to the coots, and having the upper mandible similarly extending up on the forehead in a naked soft plate, but the toes usually furnished with an undivided narrow marginal membrane This membrane and the great length of the toes enable the gallinules to swim well, and all of them are aquatic The species are about 30 in number, some of them confined to tropical regions Two occur in the United States The Florida gallinule (*Gallinula galeata*) is brownish olive above, grayish black beneath, and the bill is red It is a little more than a foot in length and is found from New York State, Minnesota, and California southward through central and northern South America, though only a summer visitor in the most of the United States Its nesting habits are like those of the coot (q v) The purple gallinule (*Ionornis martinicus*) is a trifle smaller, and a handsome olive green above, the head and underparts being a beautiful purplish blue It is a South and Central American species, common to the West Indies and the South Atlantic states, where it is resident (See Plate of RAILS, ETC) All these birds are commonly known as mud hens, and are shot for sport, but the flesh is not good

The common gallinule (*Gallinula chloropus*) of Europe is more usually styled in Great Britain water hen, or moor hen It is widely diffused in the Old World and abundant in suitable situations, such as river marshes and the artificial ponds of parks, where these birds may often be seen in considerable numbers, swimming together, with a peculiar nodding motion of the head. They seek their food both on the surface of the water and by diving, partly also among the grass of meadows and river banks A frequent jerking of the tail is very characteristic of them. When alarmed, they sometimes seek safety by flight, but more frequently by hiding among rushes or reeds They make their nests near the water which they frequent, and usually on the ground, and lay from 7 to 10 brown and speckled eggs The flesh is well flavored. See COOT, RAIL

GAL'LIO, LUCIUS JUNIUS A Roman rhetorician of the first century, a member of the senatorial order, who gained the ill will of Tiberius by proposing that retired members of the Prætorian Guard should have seats with the *equites* in the first 14 rows of the theatre He was banished from Rome, then recalled and kept under surveillance, and finally put to death by Nero His textbook on rhetoric has not survived He was a friend of Ovid and of the older Seneca, the rhetorician, whose oldest son, M Annæus Novatus, he adopted Consult Schanz *Geschichte der romischen Litteratur*, vol ii (3d ed, Munich, 1911)

GALLIO, LUCIUS JUNIUS ANNÆUS The name assumed by Marcus Annæus Novatus from that of Lucius Junius Gallio, the rhetorician, by whom, as a friend of his father, Marcus Annæus Seneca, he had been adopted He was born at Cordova, but brought up at Rome Gallio was an older brother of the famous philosopher and statesman Lucius Annæus Seneca, and of the geographer Lucius Annæus Mela, father of the poet Lucan He appears to have been a highly cultured man, and to this fact, rather than, as is generally asserted, to the influence of Seneca, his appointment as proconsul of Achaia was due The date of this appointment is now fixed beyond doubt by the recent discovery of an inscription of Claudius at Delphi belonging to the twelfth year of his reign (January, 52–January, 53 AD), in which Gallio is mentioned as proconsul and the Emperor's friend. As the office

was usually held for only a year, Gallio was proconsul either from spring of 51 to spring of 52 (or, as is much less probable, from spring of 52 to spring of 53) He was involved, though not immediately, in the same fate as befell his brother Seneca, who was disgraced by Nero in 65 A D and committed suicide Gallio's death followed some months later. All that is known of him indicates that he was a man of high character with a lovable disposition

In the latter part of Paul's first visit to Corinth the Jews, angered by the defection of leading members of the Synagogue to the Apostle's following, brought Paul before the proconsul on the charge that he was acting contrary to the [Roman] law Gallio dismissed their case, however, with the statement that he was not minded to be a judge of such matters And when Sosthenes, probably the leader of the accusing party, was taken by the [Greek] bystanders, with whom the Jews were generally unpopular, and beaten before the judgment seat, Gallio refrained from interposing, the narrative stating that he cared for none of these things (Acts xviii 14–17). From this last statement it has been inferred that Gallio was indifferent to Christianity The words of his reply, however, while betraying an ignorance of the distinctive features of Christianity, disclose simply the usual attitude of Roman officials to the religions of the people of the provinces in accordance with Roman law Its meaning is that Gallio was indifferent to the controversy, since it was a purely religious one, and considered this and the beating of Sosthenes in particular as matters outside of his judicial concern Consult, besides the usual lives of Paul and commentaries on Acts, Ramsay, *St Paul the Traveler and Roman Citizen* (New York, 1896); Zahn, *Introduction to the New Testament*, vol iii (New York, 1909), and especially Deissmann, *Paulus* (Tubingen, 1911, Eng. trans, London, 1912) See PAUL

GAL'LIOT (from OF. *galiote*, from ML. *galeota*, diminutive of *galea*, galley) A galley of medium size, having one mast and 16 to 20 oars, and very generally used in the sixteenth, seventeenth, and eighteenth centuries as a cargo vessel and gunboat by the maritime nations of Europe Also a Dutch or Flemish vessel with very full lines, an easy bilge (q v), and a flat bottom It is rigged like a ketch with a high mast stepped in the centre of the ship and a much lower one farther aft The head stays lead from the main (or higher) mast, and the head sails are large and numerous, both masts are square-rigged Galliots are usually of 400 to 500 tons' measurement They were formerly much used as bomb vessels, the absence of a mast forward giving ample space for the operation of bombards, mortars, or howitzers

GALLIPOLI, gal-lē'pō-lē (ancient Callipolis, a Greek name meaning Beautiful City). An episcopal city and seaport in the Province of Lecce, south Italy, 55 miles south of Brindisi It is picturesquely situated in the Gulf of Taranto, on a rocky island which a bridge having 12 spans now connects with the suburb of Lizza on the mainland (Map Italy, F 4). It is protected by a castle which Charles I of Anjou constructed The ancient Callipolis, founded from Tarentum, is hardly mentioned in ancient writers In the first century A D the Romans called it Anxa Gallipoli has a cathedral dating from 1629, a seminary, a gymnasium, and a technical school, also regular steamship communication with Brindisi and Taranto It exports oil, wine, and fruit, and has long been famous for its oil cisterns cut in the solid limestone It quarries stone and makes hoops for wine casks Pop (commune), 1901, 13,552, 1911, 11,427

GALLIPOLI (ancient Callipolis) A seaport of European Turkey, capital of a sanjak in the Vilayet of Adrianople, situated on the east coast of the peninsula of Gallipoli, at the northeast end of the Dardanelles (Map Turkey in Europe, F 4) It has crooked, ill-paved streets, and is built mostly of wood There are manufactures of leather, silk, and cotton, but the commercial importance of the town is on the decline, and the well-fortified harbor has more strategical than commercial value Gallipoli is a Turkish naval station, and the seat of a captain pasha and a Greek bishop The population, largely Greek, is estimated at from 20,000 to 30,000 The town was of great commercial importance during the Middle Ages and at one time had a population of 100,000 It suffered terribly at the hands of the Catalans early in the fourteenth century and fell into the hands of the Turks in 1354, being the first Turkish possession in Europe

GALLIPOLI, PENINSULA OF (the ancient Thracian Chersonesus) A portion of the Vilayet of Adrianople, European Turkey, separating the Strait of Dardanelles on the east from the Gulf of Saros on the west (Map Balkan Peninsula, F 4) It extends in a southwest direction for about 55 miles and varies from 4 to 13 miles in breadth The principal town on the peninsula is Gallipoli (q v) The land is exceedingly fertile

GALLIPOLIS, găl'lĭ-pŏ-lēs' A city and the county seat of Gallia Co, Ohio, 116 miles south of Columbus, on the Ohio River, and on the Hocking Valley and the Kanawha and Michigan railroads (Map Ohio, F 8) It is the seat of the Ohio Hospital for Epileptics established 1893, and contains a Carnegie library, a public park, and Gallia Academy The city is surrounded by undeveloped coal fields and is a distributing centre of some importance There are iron and wood-working industries, and manufactories of furniture, stoves, flour, ice, brooms, lumber, leather, etc The government is administered by a mayor, elected every two years and a city council The water works are owned and operated by the municipality Pop, 1900, 5432, 1910, 5560 Gallipolis, the third white colony in Ohio, was first settled in 1790 under the auspices of the Scioto Company, by a party of 500 Frenchmen, who named it Gallipolis (the city of the Gauls) It was incorporated as a village in 1842 and in 1865 was chartered as a city Consult W G Sibley, *The French Five Hundred* (Gallipolis, 1901)

GALLISSONNIÈRE, ga'lē'sō'nyâr', AUGUSTIN FÉLIX ELISABETH BARRIN, COMTE DE LA (1742–1828) A French soldier He was a nephew of Roland Michel Barrin, Marquis de la Gallissonnière, and was born at Anjou He entered the navy while he was a boy and served under his uncle in Canada, then he fought in the Hanoverian campaigns In 1788 he was appointed field marshal and, just before the Revolution, was invested with the grand sword of Anjou and was made president of the nobility in the States-General When the Revolution came, he was a deputy to the Constituent As-

sembly and on its dissolution refused to leave the country, but later became an *émigré* and fought under Conde But in 1801 he returned to France and was elected deputy in 1809 After the Restoration he was promoted to the rank of lieutenant general, but soon retired He wrote on many contemporaneous topics

GALLISSONNIÈRE, ROLAND MICHEL BARRIN, MARQUIS DE LA (1693–1756) A French naval officer and Governor-General of Canada (1747–49) He was born at Rochefort and at the age of 17 entered the royal navy In 1745, although only a captain in rank, he was appointed Governor-General of Canada to succeed Beauharnais He reached Quebec in 1747, and during the two years he remained in Canada displayed not only great energy, but broad statesmanship He planned to advance the French possessions in America by building a chain of forts in the Mississippi valley to connect Louisiana and Canada, by settling 10,000 French peasants in the Ohio valley to check the migration that was beginning to pour over the Alleghanies from the English colonies, and by winning the friendship and alliance of the Iroquois tribes He succeeded in establishing some forts and supported Abbé Piquet in his mission to the Iroquois country, but his request for new settlers remained unheeded In 1749 he was recalled to France to act on the commission to fix the boundaries to be established under the Treaty of Aix-la-Chapelle and was succeeded by the Marquis de la Jonquière On his return to France he was made chief of the naval Bureau of Charts and Plans, in which position he organized several important scientific expeditions In May, 1756, he defeated the English fleet under Admiral Byng off Minorca, which led to the loss of Minorca by the English and the court-martial and execution of Byng Gallissonnière died the same year

GALLITZ'IN. A borough in Cambria Co, 12 miles northwest of Altoona, on the Pennsylvania Railroad (Map Pennsylvania, D 6) Coal is mined extensively here, and coke is produced in considerable quantity The borough was named after Prince Gallitzin (q v), who started a settlement at Loretto in 1835 It was first incorporated in 1872 Pop, 1900, 2759, 1910, 3504

GALLITZIN, gal-lēt'sēn, DMITRI AUGUSTIN, PRINCE (1770–1841) An American Catholic priest, of a noble Russian family (See GOLITZIN) Born at The Hague, where his father was Russian Ambassador, he received a Spartan training from his mother, who sent him to travel in North America in 1792 His observations led him to volunteer for missionary work in America He studied at St Mary's, Baltimore, became a priest in 1795, was settled at Port Tobacco, Md, and then at Taneytown, Md, but in 1799 he was transferred to Cambria Co, Pa. He was dissatisfied with the American system of trustee control and limitation of the priestly power and founded the Catholic town of Loretto, Cambria Co, Pa, from which colonies went out to St Joseph, St Augustine, Pa, and Carrolltown, Pa In his work Father Smith (as Gallitzin called himself until 1809, when, after his father's death and his own disinheritance by the Czar, he resumed his family name) spent much effort and a large fortune He wrote several pamphlets in controversies with Protestants There is a monument to him in Loretto, with a bronze statue given by Charles M. Schwab, and Gallitzin, Pa, is named for him Consult Brownson, *Life of D A Gallitzin, Prince and Priest* (New York, 1873), and Kittell, *Souvenir of Loretto Centenary* (Cresson, Pa, 1899)

GAL'LIUM (Neo-Lat, from Lat *Gallia*, Gaul, France) A metallic chemical element, discovered by Lecoq de Boisbaudran in 1875, by means of the spectroscope and isolated by the same investigator in the metallic state in 1876 Its properties had been previously (1870) described, from the periodic law (q v), by the Russian chemist Mendeléeff, who gave it the provisional name of *eka-aluminium* It is found in minute quantities in various zinc ores and was originally discovered in the sphalerite of Pierrefitte, from which it may be obtained by dissolving the ore and decomposing the resulting solution by metallic zinc The precipitate thus obtained contains gallium as a hydrated oxide, which is then further purified by repeated solution and precipitation, and the gallium finally thrown down in its metallic state by zinc

Gallium (symbol Ga, atomic weight, 69 9) is a fairly hard gray metal that may be hammered into thin plates which can be bent without breaking It melts at 30 15° C (about 86° F), and has a specific gravity of 5 9 when solid Once melted, the metal may for years be preserved in the liquid state at temperatures considerably below its melting point, provided no trace of the solid metal is allowed to come into contact with the undercooled liquid The metal is soluble in hydrochloric and nitric acids, but best in aqua regia With caustic potash it produces an evolution of hydrogen Its general properties are similar to those of the metal aluminium Gallium combines with oxygen, forming a monoxide having the formula GaO, and a sesquioxide having the formula Ga_2O_3, and with chlorine to form a dichloride and a trichloride

GAL'LIVATS, EAST INDIAN Large rowboats, sometimes having as many as 50 oars, formerly and still to some extent used in Eastern waters They rarely exceed 70 tons, carry two masts with high triangular sails, and are generally armed with a few small swivel guns, fastened on the bulwarks The Malay pirates, now nearly exterminated, employ these swift but somewhat fragile vessels.

GAL'LIWASP (probably of West Indian origin) 1 A lizard of Jamaica and eastern Central America (*Diploglossus monotropis*), which is greatly feared by the people, though perfectly harmless 2. A small species of lizard fish (*Synodus fœtens*), common from South Carolina to Brazil See Plate of LANTERN FISHES, LIZARD FISH

GALL MITE See MITE

GAL'LON. A measure of capacity used in the United States and Great Britain and its colonies, but differing in value in the two countries, though its subdivision into four quarts is common In the United States a gallon is 231 cubic inches (3785 43 cubic centimeters), being the old Bristol wine gallon dating from the reign of Queen Anne (5 Anne c 27, § 17), a standard (1707) of which is still extant in England There were in use also in England the corn gallon of Henry VII, amounting to 274¼ cubic inches, a standard of which dating from 1495 still is in existence, and an ale gallon of 282 cubic inches was recognized by Queen Elizabeth in 1601 In 1824 these three gallons were abol-

ished in favor of the British Imperial gallon (5 Geo IV, c 74), which is defined as the volume of 10 pounds of fine distilled water at 62° F, corresponding to 277 420 cubic inches according to the best data now available, or approximately 20 per cent larger than the American gallons The gallon is used now usually for liquid measures, but the term was also applied to a dry measure, consisting also of four quarts.

GALLOTAN'NIC ACID. See TANNIN

GAL'LOWAY. An ancient province in the southwest of Scotland, now merged in the counties of Wigtown and Kirkcudbright The designation, though still in use, has no political significance The district, about 70 miles long by 40 miles broad, is famed for its mountain, lake, stream, and moorland scenery, and forms the peninsula terminating in Scotland's southernmost point, the Rhynns of Galloway, projecting into the Irish Sea It is purely a pastoral country, remarkable for its mild climate Its breeds of small horses and large, hornless black cattle have been known for centuries.

The name "Galloway" is derived from *Gall-Gael*—foreign Gaels, so called because, topographically separated from their northern brethren, they preserved their identity as a distinct race down to the twelfth century and their language beyond the fifteenth Ptolemy styled the inhabitants Novantæ and Selgovæ and described their towns Lucophibia, Rerigonium, Uxellum, Carbantorigum, etc, the sites of which have been identified After the Roman evacuation Galloway came under the power of the Anglians and later of the Norsemen Under the Anglians they acquired the name of the Picts of Galloway. In the twelfth century they were conquered by Malcolm Canmore, who made his son David Earl of Galloway When David ascended the throne of Scotland, Galloway was united to the kingdom The lords of Galloway, however, frequently revolted against Scottish rule, and the periodical troubles did not cease until the Lordship of Galloway was attached to the crown in 1455 Consult Skene, *Celtic Scotland* (Edinburgh, 1876), M'Kerlie, *History of the Lands and their Owners in Galloway* (5 vols, Edinburgh, 1870–78), id, *Galloway in Ancient and Modern Times* (ib, 1891), Maxwell, *A History of Dumfries and Galloway* (ib, 1900), Briggs *Angling and Art in Scotland* (New York, 1908), Newbigging, *A Nook in Galloway* (Gateshead, 1911)

GALLOWAY, BEVERLY THOMAS (1863–) An American botanist He was born at Millersburg, Mo, and was educated at the University of Missouri, where he was appointed assistant in the department of horticulture in 1884. In 1887 he became assistant pathologist in the Bureau of Plant Industry, United States Department of Agriculture, and in 1888 was put in charge of the division of plant pathology In 1901 he was appointed chief of the Bureau of Plant Industry and in 1912 became Assistant Secretary of Agriculture, in charge of the scientific work of the department He is the author of a number of works on botany, horticulture, and plant pathology

GALLOWAY, CHARLES BETTS (1849–1909) An American bishop of the Methodist Episcopal Church, South He was born at Kosciusko, Miss., graduated at the University of Mississippi, entered the ministry in 1868, and was pastor of several churches in his native State. An earnest advocate of the prohibition of the liquor traffic, he was long president of the Prohibition Executive Committee of Mississippi, carried on a spirited controversy with Jefferson Davis on that subject, and wrote a *Handbook* and *Open Letters on Prohibition* His publications include *A Circuit of the Globe* and *Modern Missions Their Evidential Value* He was president of the Board of Education of his church and a trustee of the John F Slater Fund

GALLOWAY, JOSEPH (1731–1803) An American lawyer and Loyalist pamphleteer He was born in Kent Co, Md, but early removed to Philadelphia Almost continuously from 1757 to 1774 he was a member of the Pennsylvania Assembly He married a daughter of Lawrence Growdon, Speaker of the House, and for 12 years was himself Speaker In 1764 he was associated with Franklin in the contest with the proprietary government, and, in opposition to Dickinson, advocated the erection of Pennsylvania into a royal province On the approach of the Revolution he was a vigorous opponent of war and of independence In 1774 he was sent by the Assembly to the first Continental Congress, where he signed the Association, and introduced (on September 28) his celebrated "Plan of a proposed Union" between Great Britain and her Colonies This plan provided for a federation under British supervision of the American Colonies, each Colony to "retain its present constitution and powers of regulating and governing its own internal police in all cases whatsoever", for a President General, "to be appointed by the King," and for a Grand Council, "to be chosen by the representatives of the people of the several Colonies in their respective assemblies, once in every three years," and to meet once a year or oftener if necessary—the President General and Grand Council to constitute "an inferior distinct branch of the British Legislature, united and incorporated with it," for certain specific purposes This scheme was supported in Congress by Edward Rutledge, John Jay, and James Duane, and was rejected by a vote of only six Colonies to five It is summed up in *A Candid Examination of the Mutual Claims of Great Britain and the Colonies* (1775) In December, 1776, Galloway joined the English army under Sir William Howe, and received an immediate allowance of £200 a year On the capture of Philadelphia he became superintendent of the port, of prohibited articles, and of the police of the city and suburbs After the evacuation of Philadelphia he accompanied the British army to New York, and in 1778 went to England, where he passed the rest of his life Soon after his departure his life was attainted, and his property, valued at about £40,000, was confiscated by the Continental Congress He was a member of the board (for Pennsylvania and Delaware) on compensating claims of Loyalists He was one of the ablest of the Loyalist pamphleteers, and wrote *Letters to a Nobleman on the Conduct of the War in the Middle Colonies* (1779), accusing General Howe of neglect of duty, *Historical and Political Reflections on the Rise and Progress of the American Rebellion* (1780); *Cool Thoughts on the Consequences to Great Britain of American Independence* (1780), *Letters from Cicero to Catiline the Second*, ie, C J Fox (1781), *Political Reflections on the Late Colonial Governments* (1782), *The Claim of the American Loyalists* (1788) Galloway also wrote *Brief*

Commentaries upon such Parts of the Revelations and Other Prophecies as Immediately Refer to the Present Times (1802), and *The Prophetic or Anticipated History of the Church of Rome, Written and Published more than Six Hundred Years before the Rise of that Church* (1803) Consult Balch (ed), *The Examination of Joseph Galloway by a Committee of the House of Commons* (Philadelphia, 1855), Tyler, *Literary History of the American Revolution* (New York, 1897), Baldwin, *Galloway, the Loyalist Politician* (New Haven, 1903)

GALLOWAY, LORD OF See DOUGLAS, FAMILY OF

GALLOWAY, MULL OF A rocky headland terminating the Rhynns of Galloway, in Wigtownshire, the southernmost point of Scotland (Map Scotland, D 5) It is 1½ miles long, ¼ of a mile broad, rises to a height of 210 feet, and is crowned by a lighthouse 325 feet above sea level, visible 25 miles

GALLOWS HILL. The name given to a hill in the neighborhood of Salem, Mass On it during the witchcraft mania of 1692 a number of victims were hanged as witches It is also called Witch Hill.

GALLS In plants, modifications of an organ or tissue due to the presence of another organism Commonly the part affected is much enlarged, either through the expansion of existing cells or the formation of new ones, or more commonly through both combined The technical term "cecidium" has been proposed as a substitute for "gall," with the purpose of using it with prefixes to indicate origin, e g, mycocecidium for a gall produced by fungi, dipterocecidium for a gall due to flies, etc Organisms producing galls are principally insects and fungi, although with the former may be included certain worms, and with the latter algæ, bacteria, and slime molds (Myxomycetes) The presence of the foreign organism, either acting directly or through some substance secreted by it, appears to render a portion of the cells of the host more active and lead to the production of an exaggerated amount of tissue near the part infected It is thought that, while this stimulus does not give the power of producing entirely new structures, it often awakens dormant characteristics and causes their expression For example, galls upon perfectly smooth rosebushes are often covered with thorns Galls show a great diversity of form Those caused by insects may be arranged into series passing from a slight depression of the epidermis of a leaf or stem to deep closed pouches, and from a slight swelling to masses of great size Some gall insects injure the growing point and, checking elongation, produce cone-shaped galls, as seen on the willow and goldenrod An interesting group of galls are the witches' brooms formed on various trees by fungi Here many small twigs spring from the part affected, giving the appearance of a brush or broom

One of the most remarkable features of galls is the development of nutritive layers rich in food, some of which is used by the parasite Galls are also often rich in tannins, substances of no apparent use to the gall former, although occasionally utilized by man, as in the use of oak galls Perhaps the greatest specialization is seen in the cynipid galls (formed by insects of the Cynipidæ) occurring upon the leaves of oaks and other plants In these, in addition to the epidermis, three distinct concentric layers of tissue are developed (Fig 1). Immediately beneath the epidermis is a region of thin-walled cells rich in tannin Then come thick-walled cells termed the protective layer, although it does not seem clear what this protection is

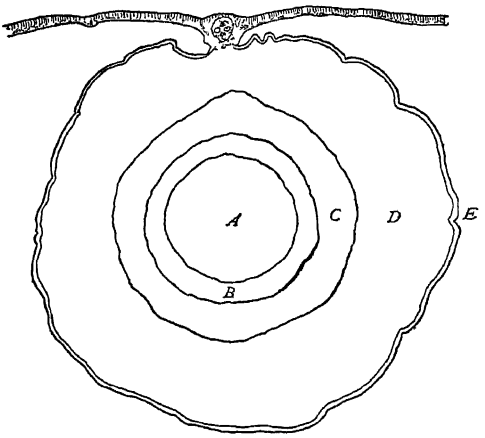


FIG 1 Diagrammatic cross section of a cynipid gall upon a white-oak leaf *A*, the larval chamber, *B*, the nutritive layer, *C*, the protective zone, *D*, the tannin region, *E*, the epidermis of the gall

against, and, finally, there are the tissues rich in food, the nutritive layer, surrounding the central larval chamber Here, as in many insect galls inhabited by larvæ, the parasite secretes a ferment changing the stored starch into sugar, and probably also stimulating increased cell production

Galls produced by parasitic plants are usually due to the presence of the organism, and since these are immobile the initial cause must be looked for in the excreta of the attacking plant

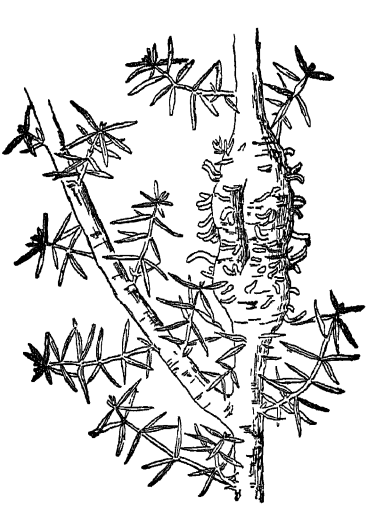


FIG 2 SHOOT OF JUNIPER

Enlarged and deformed by the presence of a fungus, *Gymnosporangium clavæforme*

Examples of galls produced by plants are the wens and tumors of various sizes and forms common upon leaves and stems infested by parasitic fungi (Fig 2). They are not easily distinguished in form from similar galls produced by insects. The club root (q.v) of cabbage and

turnips, due to the attack of slime molds, and the tubercles upon the roots of Leguminosæ, due to bacteria-like parasites, are examples of root galls (Fig 3) See GALL INSECTS

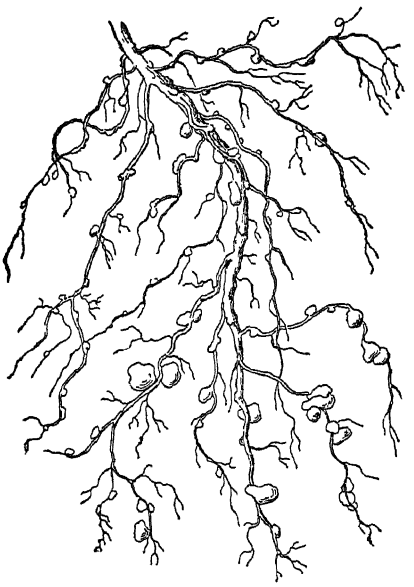


FIG 3 ROOT TUBERCLES OF A LEGUMINOUS PLANT, THE PEA
Produced by the infection of the roots with *Bacillus radicicola*

Consult H Adler, *Alternating Generations A Biological Study of Oak Galls and Gall Flies* (Oxford, 1894), E Kuster, *Die Gallen der Pflanzen* (Leipzig, 1911), A Cosens, "Morphology and Biology of Insect Galls," *Transactions, Canadian Institute*, vol ix (Toronto, 1912); E W Swanton, *British Plant-Galls* (London, 1912)

GALL STONE. See CALCULUS.

GAL'LUP. A town and the county seat of McKinley Co, N. Mex, 156 miles west of Albuquerque, on the coast lines of the Atchison, Topeka, and Santa Fe railway system and on the Puerco River (Map· New Mexico, A 3) It is in a cattle and sheep raising region, has extensive soft-coal mines and oil fields, and is the trading centre for the Zuñi and Navajo Indian reservations Pop, 1900, 2946, 1910, 2204

GALLUPPI, gal-lōōp'pē, PASQUALE (1770–1846). An Italian philosopher. He was born in Calabria of a noble family, and educated in the University of Naples For the greater part of his life he had a position in the Finance Department Though apart from academic influences, he pursued his favorite studies, and it was not till he had reached the age of 60 and had become widely known by his philosophical writings that he was called to a chair in the University of Naples, which he held till his death Galluppi's first work was an essay on analysis and synthesis (1807) This was followed by the important *Saggio filosofico sulla critica della conoscenza* (6 vols, 1819–32) Among his other works is to be mentioned *Elementi di filosofia* (1820–27) He founded his system upon the "original fact of the ego, which perceives something existing outside of itself," thus closely affiliating himself with the Scottish school, by which he was greatly influenced But in the spirit of Kant he failed to see how experience can give a knowledge of relations, because he regarded relations as the result of conscious activity Consult Lastrucci, *Pasquale Galluppi, studio critico* (Florence, 1890), Pagano, *Galuppi e la filosofia italiana* (Naples, 1897), Gentile, *Dal Genovesi al Galluppi* (Rome, 1903)

GAL'LUS A famous story of Roman life by W A Becker (1838) The work is important for its faithful reproductions of Roman customs under Augustus and for the great amount of archæological information contained in it

GALLUS, GAIUS CORNELIUS (66–26 B C) A Roman poet, orator, and general, born of a humble family at Forum Iulii (now Fréjus) in southeastern Gaul At an early age he went to Rome for an education and attended the lectures of the Epicurean philosopher Syron He studied also under Parthenios of Nicæa Vergil and Varius were his fellow pupils, and the three became firm friends He had the fortune, also, to gain the good will and friendship of Asinius Pollio, one of the greatest Romans of the time, and when Octavius (afterward Augustus) returned to Italy from the East after the assassination of Julius Cæsar, Gallus heartily joined his party and received the important charge of assigning lands in north Italy to the veterans of Octavius' army On this occasion he was able materially to help his friend Vergil, who was a native of Mantua At the battle of Actium, Gallus commanded a division of Octavius' forces, and afterward was sent, as general, into Egypt, where he defeated the armies of Antonius and captured Cleopatra, whom he kept as a prisoner in her palace Upon her death, in 30 B C, Egypt was turned into a Roman province, with Gallus as its first Governor He ruled in Egypt for four years, largely with success, but not without making enemies, and an unfortunate remark about Augustus was brought to the Emperor's notice, with many other charges Gallus was accordingly deprived of his rank and estates and ordered into exile, but he preferred death and committed suicide by falling upon his sword Gallus was the author of four books of elegies concerning Lycoris (a notorious actress, whose real name was Cytheris), he imitated Euphorion (q v). Ovid claimed for him the first place among the Roman elegiac poets, but none of his writings has survived It was at the request of Gallus that Vergil wrote his tenth *Eclogue* In modern times he has been made the hero of a well-known story, *Gallus*, by W A Becker (q v), which was translated into English by Metcalf (London, 1844, 9th ed, 1888) Consult Nicolas, *De la vie et des ouvrages de C Gallus* (Paris, 1851), Plessis, *La Poésie Latine* (ib, 1909), Schanz, *Geschichte der römischen Litteratur*, vol ii (3d ed, Munich, 1911), Skutsch, *Aus Vergils Fruhzeit* (Leipzig, 1901) and *Aus Vergils Fruhzeit II Gallus und Vergil* (1906) Skutsch ascribes to Gallus the poem called Ciris, a view accepted by Mackail, in "Virgil and Virgilianism," in *Lectures on Poetry* (London, 1911) On the other side consult Smith, *The Elegies of Albius Tibullus* (New York, 1913)

GALLUS, GAIUS SULPICIUS. A Roman soldier, orator, statesman, and scholar Under Æmilius Paulus (q v) he served as military tribune in Macedonia, against Perseus, and gained great and lasting fame because, on the basis of

his studies in astronomy (cf Cicero, *De Senectute*, § 49, Pliny the Elder, ii, 9), he predicted the eclipse of the moon which occurred on the night before the battle of Pydna, 168 B C The Romans, forewarned of the eclipse, escaped the panic which seized the enemy Gallus was consul in 166 In 164 he was ambassador to Greece and Asia Gallus was well versed in Greek as well as in astronomy

GALLUS, GAIUS VIBIUS TREBONIANUS (c 205–c 254) Roman Emperor from 251 to 254 He served under Decius in the campaign against the Goths in 251, and is said to have contributed by his perfidy to the disastrous battle in which Decius was killed Thereupon he was elected Emperor, and shortly afterward purchased peace with the Goths by permitting them to retain their plunder and their captives and promising them a fixed annual tribute In 253 the Empire was again invaded by the Goths, but they were defeated in Mœsia by Æmilianus, whose troops proclaimed him Emperor Gallus marched forth to suppress the rebellion, but was killed by his own soldiers before there had been any collision between the opposing armies

GAL'LY, MERRITT (1839–1916) An American inventor, born near Rochester, N Y He learned the printing trade, graduated at the University of Rochester in 1863, studied at Auburn Theological Seminary, and in 1866 was ordained to the ministry of the Presbyterian church After three years of pastoral work, however, he was compelled by the loss of his voice to withdraw from the pulpit, and turned his attention to mechanics He invented the Universal printing press, built an establishment for the manufacture of presses, and obtained many patents on appliances connected with printing machinery His experiments in regard to automatic musical instruments resulted in the invention of the "orchestrone" and of the so-called counterpoise pneumatic system employed in similar contrivances His patents, more than four hundred in number, also include a machine for the manufacture of printer's types from cold metal by a process of swaging

GALOIS, gä'lwa', EVARISTE (1811–32) A French mathematician, born at Bourg-la-Reine, near Paris, and killed in a duel at Paris at the age of 20½ years. While yet a pupil in the Lycée Louis-le-Grand he published in Gergonne's *Annales*, vol xix (1828), a memoir entitled *Démonstration d'un théorème sur les fractions continués périodiques*. Entering the Ecole Normale in 1830, he wrote in the next two years six memoirs on the theory of equations and the theory of numbers Galois may justly be said to be the founder of the theory of groups (see SUBSTITUTION), and, with Abel and Cauchy, to have been one of the founders of the modern theory of functions. A well-known theorem on the solubility by radicals of irreducible equations of prime degree bears his name His works attracted little attention when they first appeared, but their value became recognized when Liouville collected them in his *Journal*, vol ii His works were published under the auspices of the Société Mathématique de France, with an introduction by Picard (Paris, 1897)

GALOP, ga'lō' (Fr, gallop). A very lively German round dance in two-four time It was introduced into France early in the nineteenth century, but its popularity is now confined chiefly to Germany It is similar to the waltz (q v) but is less graceful and more animated

GALSWORTHY, galz'wûr-thĭ, JOHN (1867–) An English author His early fiction, published under the pen name "John Senjohn," was conventional and attracted little notice, it included *From the Four Winds* (1897), *Jocelyn A Tale* (1898), *Villa Rubein* (1900, new ed, with other stories, 1909), and *A Man of Devon* (1901)—the author's home was at Manaton in Devon His later novels and most of his plays are more serious and more individual, dealing with social problems Among the novels are *The Island Pharisees* (1904, revised, 1908), an attack on British conventions, *The Man of Property* (1906), satirizing the modern capitalist, *The Country House* (1907), dealing with the life of the English country gentry, *Fraternity* (1909, in German, 1911), in large measure a study of class feeling, *The Patricians* (1911), and *The Dark Flower* (1913), a well-written story with a morbid theme of passion His social dramas are even more serious, more individual, and more powerful *The Silver Box* (1906), with its theme of different legal justice for rich and poor, has been compared to Hauptmann's *Biberpelz*, and *Strife* (1909), the story of a strike, to the same author's *Die Weber* These two plays, with *Joy* (1907), a more conventional comedy, were published together in 1909 *The Little Dream* (1911) is a poetic fantasy with a touch of the morality play, it is entirely unlike the more characteristic "social dramas"—*Justice* (1909), dealing with prison life, *The Pigeon* (1912, and produced as a play in New York in 1913), a blend of comic and tragic that propounds a serious problem in poverty, and *The Mob* (1914) *Justice* and *The Pigeon* were published in 1912 with *The Eldest Son*, which was first played in November of that year Galsworthy also wrote prose sketches, *A Commentary* (1908) and *A Motley* (1910), a volume of verse, *Moods, Songs, and Doggerels* (1912), and *The Fugitive* (1913) Consult A R Skemp, "Plays of John Galsworthy" in *Essays and Studies by Members of the English Association*, vol iv (London, 1914)

GALT, galt A city in Waterloo Co, Ontario, Canada, on both sides of the Grand River, about 55 miles from its entrance into Lake Erie, and on the Grand Trunk and the Canadian Pacific railroads (Map Ontario, D 7) It is connected by electric railway with the towns of Berlin, Paris, Waterloo, and Brantford The eastern and western parts of the city are connected with bridges There are four parks There are also a collegiate institute and an extensive library and public reading room in connection with a mechanics' institute The manufactured products include edged tools, underwear, agricultural implements, boilers, engines, hats, leather, aerated waters, pumps, safes, stoves, soap and oils, wheels, boots, boxes, brass goods, etc According to census returns the value of manufactured goods increased from $2,225,343 in 1900 to $5,252,600 in 1910, a gain of 136 04 per cent The city is principally built of stone, and has gas, electric lighting, and water works The United States is represented by a consular agent The environs of the city are noted for their beauty Pop, 1901, 7866, 1911, 10,299 The city was named after John Galt, the Scottish author.

GALT, SIR ALEXANDER TILLOCH (1817–93). A Canadian financier and statesman He was born in Chelsea, London, was educated privately,

and in 1835 removed to Sherbrooke, Lower Canada, where he had been appointed to a clerkship in a colonization society. He remained in the service of this company until 1856, and during the latter half of the period was its manager He began his public career as a Liberal member of the Canadian Parliament in 1849, but opposed the Liberal government and resigned in the same year During the deep commercial depression of 1849 and the discouraging outlook, a movement for annexation to the United States was favored by eminent merchants and public men of both political parties Galt was of those who signed an annexation manifesto addressed "to the People of Canada" He did not enter Parliament again until 1853, after which he served continuously until 1872 Such was the reputation he had established for integrity of character, and as an authority on trade and financial questions, that on the fall of the Brown-Dorion cabinet in 1858 he was called upon to form an administration, but declined Being of independent and moderate views, he refused to identify himself permanently with either political party and consequently he had a small numerical following. Subsequently he joined the Cartier-Macdonald cabinet as Inspector General of the Finances During his term of office he introduced a Tariff Act in 1859 which, together with an act passed in the previous year, was the beginning of governmental adoption of protection He went out of office with the fall of the ministry in 1862 but held the Finance portfolio in the Taché-Macdonald administration from 1864 to 1866 He was active in the promotion of the plan for federation, was a delegate at the Charlottetown and Quebec conferences in 1864, and in 1865 was one of the delegates to England to urge Imperial support of the plan for union In 1866, during the last session of the Canadian Parliament under the Act of Union (1841), he procured passage of the Currency Act, securing the issue of legal-tender notes which form the basis of the present currency of the Dominion After the inauguration of the Federal government in 1867, he became first Finance Minister of the Dominion of Canada. He resigned in the same year, and afterward his public services were for the most part of a diplomatic nature In 1877 he was appointed Canada's representative on the Halifax Fishery Commission (see FISHING LAWS, *International Aspect*), and from 1880 to 1883 was High Commissioner of the Dominion in England. He was the author of a number of important pamphlets of a political nature, including *Canada· 1849 to 1859* (1860), *Church and State in Canada* (1876); *Civil Liberty in Lower Canada* (1876); *Future of the Dominion of Canada* (1881), *Relations of the Colonies to the Empire Present and Future* (1883).

GALT, JOHN (1779–1839). A Scottish novelist He was born in Irvine, Ayrshire, May 2, 1779 The family removing to Greenock, Galt was educated there and then placed in the customhouse He wrote poems and contributed to the newspapers In 1804 he migrated to London As a commercial agent, he traveled on the Continent, going as far east as Constantinople On a part of the voyage he was associated with Lord Byron, whose life he afterward wrote (1830) As secretary of the Canada Company, he was in Canada for three years (1826–29) Returning to England and then to Scotland, he devoted the rest of his life to miscellaneous literary work He died at Greenock, April 11, 1839 Galt's poetry, plays, and biographies have little interest But he holds a secure place in the progress of English fiction by his sketches of Scottish life, among which are *Ayrshire Legatees* (1820, and a good later edition, ed by G S Gordon, Oxford, 1909), *The Annals of the Parish* (1821), *Last of the Lairds* (1826) *The Omen* (1825) was praised by Scott, and *Lawrie Todd* (1830) has especial interest, as it contains admirable sketches of frontier life in America Galt undertook to rival Scott in historical fiction, and failed miserably Collected editions of his works were published in London (in 4 vols in 1868 and in 8 vols in 1899) Consult his *Autobiography* (London, 1833) His novels were edited by Meldrum (8 vols, London, 1895–96)

GALT, SIR THOMAS (1815–1901) A Canadian jurist, son of John Galt (q v), born in London, England He was educated there and in Scotland, but emigrated to Canada in 1832 He found employment for six years with the Canada Land Company, of which his father was superintendent, and later became chief clerk in the office of the Attorney-General for Upper Canada He afterward studied law, began to practice in Toronto in 1845, and in a few years took high rank as a corporation and criminal lawyer He was made queen's counsel in 1858 In 1869 he was appointed a puisne judge of the Court of Common Pleas, and in 1887 became its chief justice He was knighted in 1888 and retired in 1894

GALTON, *gal'ton*, SIR DOUGLAS STRUTT (1822–99) An English scientist and engineer, born at Spring Hill, near Birmingham He was educated chiefly at Rugby and the Royal Military Academy (Woolwich), was appointed second lieutenant of engineers in 1840, and rose to be captain in 1855 In 1847 he was appointed secretary to the Railway Commission, and in 1854 secretary to the Railway Department of the Board of Trade, in which capacity he visited the United States in 1856 to inspect railways there He became a member of the commission on sanitary conditions in military hospitals and barracks in 1858, and in 1859 chairman of the government committee for the investigation of submarine cables From 1860 to 1862 he was assistant inspector general of fortifications, in 1862–70 Assistant Undersecretary of State for War, and from 1869 until his retirement in 1875 Director of Public Works and Buildings in the Office of Works He was general secretary of the British Association for the Advancement of Science from 1871 to 1895, and a member of the council of the Institution of Electrical Engineers in 1888–90 He was best known for his studies in connection with army sanitation, and his improvements in the construction of hospitals and barracks won for him a high reputation both in England and on the Continent A ventilating grate for fireplaces, invented by him and known under his name, was at one time widely used. His publications include *Sanitary Engineering* (1877), *The Construction of Healthy Dwellings* (1880, 2d ed, 1896), *Ventilating, Warming, and Lighting* (1884), *Army Sanitation* (1887), *Healthy Hospitals* (1893)

GALTON, SIR FRANCIS (1822–1911) An English man of science, born at Birmingham, England, the third son of S. T Galton and Violetta, eldest daughter of Erasmus Darwin. He was educated at King Edward's School,

Birmingham, at the Birmingham General Hospital, at King's College, London, and at Trinity College, Cambridge, where he was graduated B A in 1844 During 1846–47 he traveled in Egypt far beyond the temples and cataracts of the Nile to the Sudan, at that time almost unexplored As a result of the stimulus given by this expedition he started in 1850 to explore in South Africa In company with J C Andersson, he landed his expedition at Walfish Bay, and from August, 1850, to January, 1852, he was engaged in the exploration of Damaraland (German Southwest Africa) In these travels he discovered the Ovampo race, a partly civilized, agricultural people As a result of this exploration the whole country from Lake Ngami to the seacoast, between 18° and 23° S latitude, became known for the first time The scientific results of the expedition were published in the *Royal Geographical Society's Journal* for 1852, and in his book, *Narrative of an Explorer in Tropical South Africa* Galton also published *Art of Travel, or Shifts and Contrivances in Wild Countries* (1855), which has gone through several editions, has won well-merited appreciation, and exhibits Galton's characteristic ingenuity. About this time Galton turned his attention especially to meteorology, the result being his *Meteorographica, or Methods of Mapping the Weather* (1863), which is the basis of our present familiar weather maps The theory of anticyclones, which is at the foundation of our weather forecasts, was also proposed by him, and various inventions relating to meteorological and geographical affairs were given out by him from this period to 1881 This interest in the statistical science of meteorology had an importance in Galton's future work In 1869 was published his *Hereditary Genius* (reissue, 1914), and from that time on his anthropological and biological interests, first awakened in Africa, became uppermost In 1873 he first began to apply statistics to anthropology In 1874 appeared his *English Men of Science*, and in 1883 his *Inquiries into Human Faculty*. In the latter volume he discussed various psychological topics, such as color blindness, the capacity for distinguishing high tones (for the determination of which he invented a piece of apparatus see PSYCHOLOGICAL APPARATUS, *Acoustics*), criminality and insanity, gregarious and slavish instincts, mental imagery, number forms and colored hearing, composite portraiture and the relative sensitiveness of blind and seeing, savage and civilized individuals In 1883 he sought for quantitative data on inheritance, and issued his blank *Record of Family Faculties*, of which 150 were filled out and sent to him for study. The results of these studies appeared in his *Natural Inheritance* (1889), in which the quantitative method of studying variation is developed. In 1892 was issued his *Finger Prints*, and in 1895 his *Index of Finger Prints* He was joint editor with E Schuster of *Noteworthy Families* (1906), and in 1908 published *Memoirs of my Life* For many years Galton's chief interest in the field of biology lay in the problem of inheritance, his aim being to formulate it in quantitative terms This he succeeded in doing, first by his law of ancestral inheritance, and secondly by the application of the theory of probabilities to the measurement of variations He thus laid the foundation for the new "science" of eugenics (q v) In 1905 he established a laboratory for eugenics at University College London, and in 1909 he published a collection of addresses under the title *Essays in Eugenics* He was also a consulting editor of *Biometrika*, from its establishment in 1902 until his death, which occurred Jan 17, 1911 He had been knighted in 1909 Galton was one of the last of the great English series of nonprofessional men of science

GALTON WHISTLE See PSYCHOLOGICAL APPARATUS, *Acoustics*

GALUPPI, gä-lōōp'pē, BALDASSARE (1706–85) An Italian composer He was surnamed IL BURANELLO, from the island of Burano, near Venice, the place of his birth He was the pupil of his father, a barber, who was a good violinist Although the composer of more than 100 operas and smaller works, all are now forgotten except a sonata for the harpsichord, which is included in the *Alte Klaviermusik* of Pauer His principal success was in comic opera, by which he gained the title of "father of Italian comic opera" Apart from this, he is of some importance historically, owing to his connection with the growth of music in Russia His principal appointments and tours were 1741, tour to England, 1762–64, master of music at San Marco, Venice, and director of the Conservatorio degli Incurabili, 1765–68, maestro to Catharine II of Russia, and afterward, up to the end of his career, director again of the Incurabili in Venice He died in Venice Consult A Wotquenne, *Baldassare Galuppi* (Leipzig, 1902)

GALVANI, gäl-va'nē, LUIGI (1737–98). A famous Italian physician and anatomist, and the discoverer of current or "galvanic" electricity He was born at Bologna and at an early age relinquished an intention of entering the Church, to follow the profession of medicine, devoting himself to the study of physiology and comparative anatomy He married the daughter of Galeazzi, a distinguished member of the medical faculty of Bologna, whom he succeeded in 1762 as professor of anatomy His writings, though not numerous, contain valuable scientific matter and are characterized by a rare precision and minuteness of detail Two treatises which added considerably to his reputation are· *Considerations on the Urinary Organs of Birds* and *On the Organs of Hearing of Birds* It is to a purely casual discovery, however, that Galvani owes the wide celebrity attached to his name It is related that Galvani's wife happened one day to notice the convulsive muscular movements produced in a skinned frog when the nerve of the leg was accidentally touched by a scalpel which lay on the table and had become charged by contact with an adjoining electric machine She communicated the phenomenon to her husband, who instituted a prolonged series of experiments (1790) He came to the conclusion that the source of electricity lay in the nerve, and that the metals which are necessary served merely as conductors (See ELECTRICITY, ELECTRICITY, ANIMAL) In consequence of his refusal to take the oaths prescribed in 1797 by the Cisalpine Republic, of which Bologna formed a part, he was deprived of his position and income, but was subsequently restored A statue of Galvani was unveiled at Bologna in 1879 His writings have been chiefly published in the memoirs of the Bologna Institute of Sciences, including the treatise entitled *De Viribus Electricitatis in Motu Musculari Commentarius* (1792), which con-

tained an account of his discovery and experiments, and translated into German is to be found in Ostwald's *Klassiker der Exakten Wissenschaften, No. 52* (Leipzig, 1894) A complete set of his works was published at Bologna in 1841 See GALVANIC BATTERY, VOLTAIC CELL OR BATTERY

GALVAN'IC BATTERY The names of Galvani and Volta have both become inseparably associated with the earliest device to produce a continuous current of electricity—a device now commonly known as a *voltaic cell* In its simplest form it consisted of a strip of zinc and one of copper immersed in a solution of salt, or of an alkali

Galvani, in 1786, made the capital discovery that freshly prepared frogs' legs, hung by a copper wire on an iron balcony, twitched convulsively whenever the flesh touched the iron He rightly ascribed this effect to electricity, but erroneously supposed that it proved the existence of animal electricity generated by nerves and muscles Volta showed by experiment that Galvani was wrong, but he made the equally erroneous assumption that the electricity was due to the contact of the two dissimilar metals His experiments led, however, to the invention of the celebrated "crown of cups" about 1800, consisting of a number of simple elements or cells joined in series, the copper strip of one being connected with the zinc of the next Such cells and their less simple successors are therefore properly called voltaic cells, though the word "galvanism" is still retained in medical literature to denote the current obtained from them

When Davy, in 1801, substituted dilute acid for Volta's salt or alkaline solution, it was found that there was local action which caused the zinc to waste away Kemp and Sturgeon in 1830 drew attention to the fact that a diminution of this local action was brought about by the amalgamation of the zinc plate The amalgamation consists in forming a mercury-zinc alloy on the surface of the zinc. This is best done by first cleaning the zinc by rubbing it with dilute sulphuric acid and then applying a small quantity of mercury. The amalgamated zinc plate acts like pure zinc, and wasteful local action is largely prevented See VOLTAIC CELL OR BATTERY for a full discussion of primary cells and batteries

GAL'VANISM. See ELECTRICITY

GAL'VANIZED IRON. Iron which has been coated with zinc to prevent it from rusting The iron is simply dipped or immersed in melted zinc, not coated by any galvanic process, as its name would imply The process of galvanizing iron is now practiced on a most extensive scale The French chemist Dumas states that so long ago as 1742 Malouin knew of a plan for coating iron with zinc At all events, it is stated in Bishop Watson's *Chemical Essays*, issued in 1786, that a method (essentially the same as that now in use for zincking iron) was then practiced at Rouen for coating hammered iron saucepans with zinc, and some details of the operation are given The first English patent for galvanizing iron was granted to H W Craufurd in 1837, and another for the zincking of iron which had been previously tinned was taken out by E Morewood in 1821 The process as employed by Craufurd, which is still essentially unchanged, was first to remove the rust and scale from the iron by *pickling*, i e, immersing it in dilute sulphuric or hydrochloric acid, either hot or cold, although the former state was preferred, and for this purpose the acid was kept warm in a large leaden bath, sunk in the ground for easier access After the sheets or other articles of iron had been acted upon by the acid for a few minutes, more or less according to their requirements, they were plunged into cold water, to remove the acid, and afterward scoured with sand, and again washed clean with water The iron being now ready to receive its coating of zinc, it is plunged into a bath of that metal, which, previous to its being melted, is coated with a thick layer of dry sal ammoniac (chloride of ammonium), this melts also, and forms a viscid coating over the metal, which prevents that rapid oxidation to which the molten metal is otherwise liable

For inferior material the scouring with sand is usually dispensed with The sheets of iron are then made to pass between two iron rollers in the zinc bath and are thus more easily drawn through and kept perfectly smooth Ships' bolts, nails, screws, chains, etc, are dipped in, in bundles, or in the case of nails, etc, in iron strainers, when removed, the zinc makes them adhere together, and to effect their separation, they have to be placed in a crucible with powdered charcoal, in which they are heated to redness, and repeatedly shaken as they cool, by this means they are easily separated

Galvanized iron is largely used in the form of sheets, both plain and corrugated, for roofs, sheds, and cisterns, in the state of wire, besides that used for telegraph or telephone conductors, a large quantity is employed for wire ropes, netting, and the like, and it has innumerable minor applications, such as for water vessels ship fittings, and many other articles formerly made of wood, copper, brass, slate, etc For most of these purposes the zinc coating on castings or forgings is much more lasting and less troublesome than the natural materials would be, but still in certain situations, as where it is exposed to the action of sulphurous compounds in smoke, and where its surface is to be abraded or brought directly into contact with deleterious chemical substances, its use cannot be recommended, and in these circumstances other plans should be resorted to for the protection of the iron

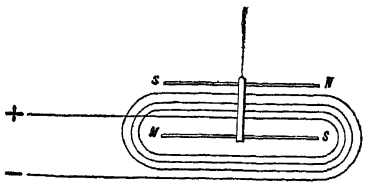
The plan adopted for making the variety of galvanized iron called *galvanized tinware* is as follows· The sheets or other articles, after being pickled and scoured and washed, as in the usual process, are transferred to a large wooden bath On the bottom of the bath is first placed a layer of finely granulated zinc, then a sheet of iron, then another layer of granulated zinc, and so on as far as convenient, and the bath is filled up with a diluted solution of chloride of tin, so that by means of the galvanic action produced the tin becomes deposited thinly over the sheets of iron The plates are then taken to the zinc bath, prepared exactly as in the ordinary process, where they are dipped or passed through the rollers. By this process a very even deposit of zinc is produced, and the material so made is preferred for some purposes to ordinary galvanized iron, although its properties are much the same.

GAL'VANO CAUTERY. See CAUTERY

GAL'VANOM'ETER (from *galvanic* + Gk. *μέτρον, metron*, measure) An instrument for detecting the presence of an electric current and

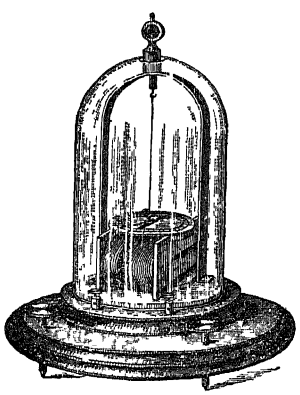
measuring its magnitude Originally it consisted of a coil of insulated wire surrounding a magnet, freely hung or pivoted so as to be easily deflected by the passage of a current through the coil The wire forming the coil is so wound that each turn lies in a plane approximately parallel to the axis of the needle or magnet when at rest The current in passing through the coil or bobbin of insulated wire produces a magnetic field in the space in which the needle hangs and tends to swing the needle around until it hangs crosswise in the coil The force tending to deflect the needle is proportionate to the strength of this field, or, what is the same thing, the strength of the current producing it, and to the length and strength of the needle, while the magnetic force of the earth acts to keep the needle in the direction of the magnetic meridian Under the influence of these two forces the needle will come to rest in a position where they are in equilibrium As the shape and strength of the magnetic needle, speaking broadly, remain the same in a given galvanometer, the instrument affords a means of measuring the strength of any current passed through it, by the amount of motion imparted to the needle

These conditions can be reversed and the coil suspended and the magnetic field produced by a permanently mounted magnet, as in the case of the D'Arsonval galvanometer described below Galvanometers are constructed in a great variety of forms, specially suited to various uses, from simple instruments for merely indicating the presence of a current to extremely elaborate apparatus for making measurements of great accuracy The action of the galvanometer depends upon the following principle discovered by Oersted in 1820 When a magnetic needle is placed under a straight wire, through which a current passes, it is deflected to a certain extent, and when the wire is bent, so as also to pass below the needle, it is deflected still more The north pole of the needle is deflected to the left if the current is flowing from south to north in a conductor which is placed above the needle, and vice versa when the conditions are reversed The direction of the deflection can be remembered by Ampère's rule which states that, supposing a man swimming along the conductor in the direction of the flow of the current and always facing the needle, the latter will be deflected towards his left hand The current in the upper and the lower wire moves in opposite directions, but, as they are on opposite sides of the needle, the deflection caused by both wires is in the same direction By thus doubling the wire we double the deflecting force Schweigger and Poggendorf soon ascertained that if the wire, instead of making only one circuit round the needle, were to make two, the force would be again double, and, if several, the force (leaving out of account the weakening of the current caused by the additional wire) would be increased in proportion If the circuits of the wire are so multiplied as to form a coil, this force would be enormously increased, and the galvanometer rendered more sensitive These early galvanometers were called multipliers and have been much used The next improvement in the instrument was due to Nobili, who employed two needles, placed parallel to each other as nearly as possible, with their poles turned opposite ways and suspended by a thread without twist. These needles have little tendency to place themselves in the magnetic meridian, for one tends to move in a contrary direction to the other If they were exactly equivalent, they would remain indifferently in any position,

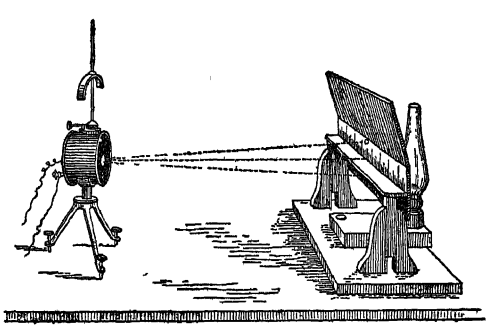


ASTATIC NEEDLE AND COIL

but they cannot be so accurately paired as this, for they almost always take up a fixed position, arising from the one being somewhat stronger than the other Such a compound needle is called *astatic*, as the magnetic influence of the earth does not determine the direction in which it will point If an astatic needle be placed in a coil, so that the lower needle be within the coil, and the upper one above it, its deflections will be greater than those of a simple needle, for two reasons In the first place, the power which keeps the needle in its fixed position is small, and the needle is consequently more easily influenced, in the second place, the force of the coil is exerted in the same direction on two needles instead of one, for the upper needle being much nearer the upper part of the coil than the lower, is deflected alone by it, and the deflection is in the same direction as that of the lower needle An astatic needle so placed in a coil constitutes an astatic galvanometer The coil is formed of fine copper wire, insulated with silk, and wound on a frame or bobbin The astatic needle is placed in this bobbin,



ASTATIC GALVANOMETER

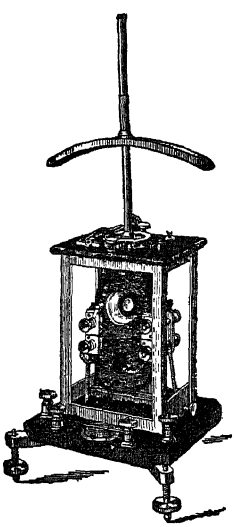


THOMSON REFLECTING GALVANOMETER (SINGLE COIL)

which is provided with a vertical slit, to admit the lower needle, and a lateral slit, to allow of its oscillations, and is suspended by a cocoon fibre from a hook supported by a brass frame

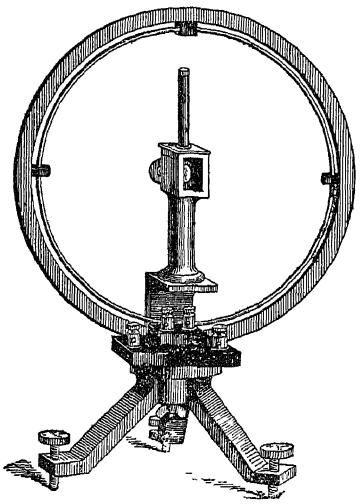
The upper needle moves over a graduated circle, and the entire system hangs freely, without touching the bobbin The instrument is inclosed in a glass case and rests on a stand, supported by three leveling screws When used, the bobbin carrying the divided circle with it is turned until the needle stands at the zero point of the scale, and the wires through which the current is sent are joined to the bending posts, which connect with the terminals of the coil The number of degrees that the needles are deflected under the action of the current may then be read off, showing the strength of the current

For most kinds of testing and measurement extremely sensitive galvanometers are required Of these, the reflecting galvanometer, designed by Sir William Thomson, is one of the standard types One form is shown in the illustration In this instrument a reading is made by the use of a ray of light reflected upon a screen from a mirror attached to the needle so that even the smallest motion is shown The Thomson galvanometer consists of a pair of astatic needles attached by shellac or other adhesive material to a mirror made of very thin microscope glass This is suspended by a single fibre of raw silk in the centre of a coil containing many thousand turns of fine wire The whole is suitably protected from currents of air by a glass case, and the base is mounted upon leveling screws, so that the hanging needle may be adjusted to swing freely in the centre of the coil The needle is caused to point to zero of the scale by a powerful magnet outside of the case, which is adjustable as to direction by a tangent screw, and may be removed to any distance to weaken its effect upon the needle or increase its sensitiveness This galvanometer is much used in all kinds of testing work and was originally employed for reading the delicate signals in ocean telegraphy, where it still is used in testing Increased sensitiveness may be obtained by using two sets of coils and needles, while there are Thomson galvanometers in which there are four such sets of coils



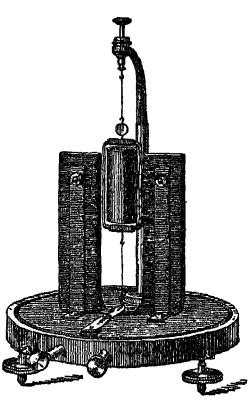
THOMSON DOUBLE COIL GALVANOMETER

For experimental work and laboratory demonstrations the tangent galvanometer is used. This instrument is shown in the illustration It consists essentially of a thick strip or wire of copper bent into the form of a circle, from 1 to 2 feet in diameter, with a small magnetic needle with pointers of thin glass fibres moving on a graduated circle, at its centre, supplied with a mirror When the needle is small compared with the ring, it may be assumed that the needle, in whatever direction it lies, holds the same relative position to the disturbing power of the ring This being the case, it is easy to prove that the strengths of currents circulating in the rings are *proportional to the tangents of the angles of deviation of the needles* Thus, if the deflection caused by one voltaic cell was 45°, and of another 60°, the relative strengths of the currents sent by each would be as the tangent of 45° to the tangent of 60°, viz, as 1 to 1 73 The needle can never be deflected 90°, for, as the tangent of 90° is infinitely large, the strength of the deviating current must be infinitely great—a strength manifestly unattainable The tangent galvanometer can consequently be used to measure very strong currents



MIRROR TANGENT GALVANOMETER

A common or detector galvanometer is an instrument used in ordinary shop work, and for outdoor testing where a portable instrument is required, and the other forms are too delicate It contains a large magnetic needle or compass swinging upon a pivot A small cavity formed in an agate let into the centre of the needle is usually employed to prevent friction in swinging upon the pivot The coils of wire are placed underneath the dial bearing the graduations over which the needle swings, and the whole is inclosed in a round brass box, with a glass cover over the needle For convenience, a circuit-closing key for admitting current to the coil is often built into the case and permanently connected with the coils Such a galvanometer is often used in connection with a set of resistances for making measurements of resistance by the Wheatstone bridge (q v), and in that case the apparatus is known as a combination or portable testing set



SIMPLE D'ARSONVAL GALVANOMETER

The D'Arsonval Galvanometer is quite different in its underlying principle from the instruments already described, for, instead of having the magnet suspended and deflected under the influence of the current in a surrounding coil of wire, the coil itself is suspended between the poles of a compound horseshoe magnet. This

coil is made of fine copper wire, wound on a rectangular frame of thin copper, and suspended by a fine wire of silver or copper, through which the current flows to the coil The other end of the coil is connected to a similar wire, which leads to one of the binding posts, the supporting wire being connected with the other The coil can thus oscillate freely in the space between the two magnets and is in a strong magnetic field When a current flows through the coil, an opposing field is set up, and the coil, being free to move, is deflected The motion of the coil can be determined either by a light pointer or by means of a mirror and a reflected beam, as in the case of the Thomson galvanometer The D'Arsonval galvanometer is, perhaps, at the present time the most used of all forms of galvanometer, since it is not affected by any external magnetic influences and is easily adjusted It is also aperiodic, or "dead beat," the coil coming to rest almost instantly and thus saving much time to the observer For these and other reasons this galvanometer is extensively used for making tests and measurements, and certain modifications, such as the substitution of jeweled bearings for the suspension, have been introduced, so as to render the apparatus portable, and appropriate shunt and other resistances, so as to indicate current and electromotive force directly by means of a pointer and scale Such instruments form most accurate ammeters and voltmeters

The Ballistic Galvanometer is intended to measure currents of extremely brief duration, such as those produced by the discharge of a condenser or by induction, and a magnetic needle of considerable mass is employed which has a period of vibration amounting often to several seconds Instead of coming to rest after its deflection by the current, the needle will continue to oscillate, as there are no damping devices, and as the needle itself has considerable mass When used to measure a momentary current, the deflection does not begin to move practically until the current has passed, and then the throw of the needle is noted This instrument is used to determine the capacity of a condenser and to measure self-induction.

Recent progress in the design and construction of galvanometers has been confined more to the attainment of greater sensitiveness and the adaptation of special types for the measurements to be made than in any radical change of operating principle or methods of control. The recent marked improvement and more dependable accuracy of portable and commercial measuring instruments, such as ammeters and voltmeters (qq v), has led to their introduction on a large scale in the physical laboratory, and the consequent displacement by them of galvanometers Several special types of the latter have, however, found extended use in certain kinds of testing For example, for the absolute measure of resistance in which two-phase alternating currents are employed, a vibration galvanometer has been successfully used, and by suitable adjustments it can be made sensitive only to the fundamental wave of the alternating current, or to such of the harmonics as it is deemed necessary to include Another test in which this type of galvanometer is used is in the examination of steel for use in transformers, where it is also found highly satisfactory Almost all recent designs are patterned after the D'Arsonval type of instrument, which it should be noted is the principle of operation of a large number of the commercial ammeters and voltmeters referred to above While the vibration galvanometer is useful in alternating current testing for ordinary frequencies, say from 15 to 100 cycles per second, it is now very common to employ a combined electrical and optical instrument called an oscillograph (q v)

Bibliography. Consult Kempe, *Handbook of Electrical Testing* (7th ed , London, 1908), and Thompson, *Elementary Lessons in Electricity and Magnetism* (rev ed , Chicago, 1906), which contains a full elementary description of galvanometers and the theory of their action Consult also the catalogues of the leading European and American electrical instrument makers

GAL'VANOTAX'IS See ELECTROTAXIS

GAL'VANOT'ROPISM See TROPISM

GAL'VESTON A city, port of entry, and the county seat of Galveston Co , Tex , on the east end of Galveston Island, at the mouth of Galveston Bay, 48 miles by rail southeast of Houston, on the Galveston, Harrisburg, and San Antonio, Gulf, Colorado, and Santa Fe, International and Great Northern, Missouri, Kansas, and Texas of Texas, Galveston, Houston, and Henderson, and the Gulf and Interstate railroads, and Galveston-Houston Electric Railway (Map Texas, E 5) A regular steamship communication is maintained with all important European, Asiatic, Latin American, and Cuban ports, and all important American ports by coastwise steamship lines. Commercially Galveston is the greatest cotton port in the world, alternates with New Orleans as second greatest port in value of exports and imports in the United States (next only to New York) As a seaside and health resort Galveston holds first place in the Southwest, this feature attracting more than 1,000,000 visitors annually

The city of Galveston has a total area of nearly 15 square miles It is built on the east end of Galveston Island, covering the entire width of the island westward to the city limits. The wharves of the port are built on the north shore of Galveston Island, the deep-water channel on which they abut being an arm of Galveston Bay, lying between Galveston Island and Pelican Island, the latter having been greatly augmented by material dredged from the Galveston Channel The south side of Galveston Island is washed by the surf of the Gulf of Mexico A hard level beach, 200 feet wide and 38 miles long, provides a natural automobile speedway upon which automobile racing meets are held during Galveston's annual summer Cotton Carnival.

The United States government has expended through various departments nearly $30,000,000 in Galveston A strategic point of great importance in the Gulf of Mexico, here are located the coast artillery posts of Fort Crockett, Fort San Jacinto, and Fort Travis, guarding the harbor with mortar batteries and 10-inch disappearing coast-defense rifles Here also are located a United States quarantine station a United States immigrant station (through which, during the fiscal year ending June 30, 1914, there entered 11,633 immigrant aliens, bringing with them $619,884 in cash), the office of the United States Marine Hospital Service, and the State branch of the United States Weather Bureau

Galveston's educational institutions include the State Medical College (the department of

medicine of the University of Texas), St Mary's University (Roman Catholic, opened in 1854), Ursuline Convent (Roman Catholic, opened in 1848), nine public schools (six for white and three for colored children), including the Ball High School for white pupils and the Central High School for colored pupils, St Joseph's School, Cathedral School, Dominican Convent, St Patrick's School, and the Sacred Heart Academy (the last five being Roman Catholic), and the Rosenberg Library, costing $250,000 and endowed with $400,000 The city possesses the Galveston Orphans' Home, St Mary's Orphanage, the Lasker Home for Homeless Children, the Letitia Rosenberg Home for Aged Women, and two magnificently equipped hospitals—St Mary's Infirmary and the John Sealy Hospital, the latter operating in connection with State Medical College Fronting on State Medical College campus are also the recently completed Nurses' Home and the Women's Hospital Other notable structures are Galveston County Court House, the United States Custom House and Post Office, the City Hall and Auditorium, the Union Depot and General Office Building of the Gulf, Colorado, and Santa Fe, the Young Men's Christian Association Building, the Masonic Temple, Scottish Rite Cathedral, American National Insurance Building, Trust Building, Security Building, Hutchings-Sealy Bank Building, and numerous other modern business buildings

Since the West Indian hurricane of 1900 Galveston has been insured against disaster by storm through the completion of three tremendous engineering enterprises— the sea wall, the grade raising, and the causeway The sea wall covers the entire frontage of the city facing the Gulf of Mexico This is a concrete steel-reenforced battlement, 17 feet high, 16 feet wide at base, 5 feet wide at crest, with a concave face, its base protected by a riprap of huge Texas granite blocks It cost $2,000,000 The causeway, joining Galveston Island with the Texas mainland at Virginia Point, is a 2-mile concrete steel-reenforced structure, costing $2,000,000 and spanning Galveston Bay Passage is permitted ocean-going steamships by a Scherzer type roller lift bridge, the largest in the world Three railroad tracks give entry to six lines of steam road and the Galveston-Houston Interurban, an electric road In addition there is a roadway for vehicles and pedestrians The grade raising was an engineering feat literally lifting the city to a maximum of 19 feet above its former level, overlooking at the crest by 2 feet the crest of the sea wall Houses were raised on stilts, street-car lines run as elevated lines, elevated planks substituted for sidewalks, while 20,000,000 cubic yards of sand was dredged from the bed of the Gulf of Mexico and pumped into the city at a cost of nearly $2,500,000, after which sidewalks, paved streets, and car tracks were relaid, fences rebuilt, and all vegetation replanted

Equally great engineering feats were accomplished by the United States government in bringing deep water to Galveston harbor, a total of $15,000,000 having been spent in this improvement Granite jetties 12 miles long were built to form a vestibule to the harbor, which is now maintained at a minimum depth of 31 feet The jetties alone cost $8,000,000 Six miles of improved wharf frontage utilizing the "slip system" permit 104 ocean-going freighters to dock in key berths simultaneously in position to take on and discharge cargoes On these wharves and in the yards directly abutting them are nearly 75 miles of terminal railroad track running direct to shipside Four export grain elevators have a total storage capacity of nearly 4,000,000 bushels Cotton concentration plants, ranging from open-air sheds to modern concrete storage warehouses, can accommodate 1,000,000 bales of cotton for storage, and in the course of a season handle as high as 4,000,000 bales A clearing and conditioning elevator, coal elevator, dry dock and marine ways, marine works, creosoting plant, iron and steel material warehouses, broom-corn warehouses, and general storage warehouses and distribution headquarters are also located on the water front These commercial interests were brought to the Galveston water front through the admirable location of the port as a storage and distributing point for the entire Southwest, equipped with excellent rail and water transportation facilities

Commercially Galveston has steadily climbed in importance from 1890, when her total exports and imports were valued at $24,862,623—seventh port of the United States—to her record year ending June 30, 1913, when exports and imports were valued at $289,278,496—second only to New York For the fiscal year ending June 30, 1914, imports and exports were valued at $268,003,129 A short Texas cotton crop was the reason of the decrease from the record of the previous year

During the fiscal year ending June 30, 1914, Galveston's exports were valued at $255,767,608, the imports being valued at $12,245,062 Chief among the exports were 3,040,675 bales of cotton, valued at $234,249,290, wheat, 10,057,589 bushels, valued at $9,469,228, cottonseed cake 319,124,093 pounds, valued at $4,874,961, cottonseed oil, 2,755,139 pounds, valued at $193,262, linseed cake, 5,890,050 pounds, valued at $89,678, flour, 343,791 barrels, valued at $1,762,994, lumber and lumber products, $2,567,915 Mill and mining machinery, agricultural implements, rice, scrap iron, lard, lard compounds and substitutes, oils, etc, were also important export factors Coffee, sugar, Mexican cattle, Argentine corn, German toys, and bananas were important items in the import list Export and import trade between Galveston and Latin America totaled $15,766,019 in value during the fiscal year ending June 30, 1914, an increase of $6,380,928 over the previous fiscal year In spite of internal war in Mexico, Galveston's exports and imports with Mexican ports totaled $3,350,566, an increase of $1,712,051 over the business of the previous year Cattle, bananas valuable woods from Mexico, grain from the Argentine, sugar from Cuba, and bananas from Central America formed the bulk of Galveston's Latin American imports Packing-house products (hams, bacon, lard), breadstuffs, lumber, and machinery formed the greater proportion of Galveston's exports to Latin America Galveston's manufacturing interests are varied and of considerable importance Beer, cement, pipe, ice, iron, ship machinery, sashes, doors, blinds, cottonseed oil, cottonseed cake, cottonseed flour and meal are produced The greatest cottonseed-cake grinding plant in the world is located on the Galveston water front

Galveston gave the world the city commission form of municipal government. Its city affairs

are in the hands of a board of commissioners, consisting of a mayor president and commissioners of streets and public property, finance and revenue, police and fire, and water works and sewage This plan, first put in operation in Galveston in 1901, has since been copied widely throughout the United States and Europe The mayor president and commissioners are elected by direct vote of the people, the mayor president running for that office alone The four candidates for city commissioner receiving the highest number of votes form the commission. Upon taking office the commission by vote of its four members assigns to each commissioner the department which he shall supervise during his two-year term of office The mayor president is paid $2500 per year, and each commissioner $1200 per year All members of the board are vested with equal power All the city officers are appointed by the board and are responsible thereto

Galveston's history ranges back into the kaleidoscopic days of romance and adventure in the Southwest The settlement was named "Galvezton" after Count Bernardo de Galvez, Spanish Viceroy of Mexico In 1816 the notorious Baratarian pirate, Jean Lafitte, took possession and made the town his headquarters He was later driven out by the United States government In 1836 Col Michael B Menard organized the Galveston City Company and purchased the site of modern Galveston for $50,000 from the Republic of Texas In 1837 Audubon, the world-famous ornithologist, made his home here That year Galveston was made a port of entry, Gail Borden, Jr, building the first customhouse In 1838 President Sam Houston, of the Republic of Texas, created Galveston the seat of justice for Galveston County The first wharf of the present $15,000,000 system was built by Col Amasa Taylor in 1838 The port was blockaded by the Federal fleet throughout the Civil War The battle of Galveston was fought in the harbor and won by the Confederate forces, Jan 1, 1863 In June, 1865, Federal troops occupied the city

Galveston was practically razed by a destructive fire in November, 1885 On Sept 8, 1900, the greatest disaster, resulting from purely natural causes, in the history of the North American continent took place A West Indian hurricane drove a tidal wave across the city, inundating Galveston to a depth of 4 to 16 feet Property worth $20,000,000 was destroyed overnight, and approximately 8000 deaths resulted Help was poured in from all parts of the world, and out of the storm emerged a wrecked city with a nucleus of 20,000 left from a prosperous community of 38,000 Since the storm the population has passed the 50,000 mark, a model municipal government has been established, a wrecked community's credit restored, and gigantic engineering projects carried to a successful completion The city owns and operates the water works, sewage disposal, and electric-light plant The street-railway system comprises 38.72 miles of track Over 20 hotels have been built to accommodate resort crowds, one of these being a community hotel, Hotel Galvez, built from $1,000,000 raised by popular subscription Pop, 1890, 29,084, 1900, 37,789, 1910, 36,981, 1914 (U S est), 40,289, 1914 (City Directory figures), 49,879; 1920, 44,255

GÁLVEZ, gal'vâth, BERNARDO DE, COUNT DE (1755–86). A Spanish administrator, Governor of Louisiana and Viceroy of Mexico. He was born near Malaga, a member of a powerful Spanish family, entered the army in 1771, studied military science in France in 1772–75, served under O'Reilly against the Algerians in the latter year, rising to the rank of brigadier, and in 1776 was sent to Louisiana as Lieutenant Governor under Luis de Unzaga, whom he succeeded Jan 1, 1777 During the Revolutionary War his sympathies were largely with the Americans, whom he assisted in various ways, even before Spain's declaration of war against England in June, 1779, after which he prosecuted hostilities with considerable energy against the English possessions in this part of the country, and succeeded in capturing Fort Manchac, Baton Rouge, and Fort Panmure de Natchez (1779), Mobile (1780), and Pensacola (1781) From 1781 to 1783 he was in command of the army of operation against the English, in the West Indies As a reward for his successes and his administrative ability, he was raised in 1783 to the rank of Count and promoted to be lieutenant general In 1784 he was appointed Captain General of Cuba, retaining the same rank in Louisiana and the Floridas The next year he succeeded his father, Matías de Gálvez, as Viceroy of New Spain (Mexico), where he and his wife, Doña Felicitas San Maxent, of a French family of New Orleans, were well received and became very popular Because of the ostentation in his life, and his construction of the fortified palace at Chapultepec, he was accused of planning to create an independent Mexican kingdom, with himself as king The attitude of the home government towards the pardon of three criminals brought on melancholia, and he died when only 31 years old He introduced many important reforms, in both Louisiana and Mexico, and has been regarded as one of the ablest Spanish administrators sent to America Consult Gayarré, *History of Louisiana*, vol iii (last ed, New Orleans, 1885), H H Bancroft, *History of Mexico, 1516–1887* (San Francisco, 1883–88), Zamacois, *Historia de México* (Barcelona, 1878–88)

GÁLVEZ, gal'vâth, JOSEPH (or JOSÉ), MARQUÉS DE LA SONORA (1729–87) A Spanish statesman and Minister of the Indies, born at Macharaviaya, near Malaga He studied law at the University of Alcalá, and after taking his degree went to Madrid, where he proved his ability in the defense of a number of important cases Of a literary turn of mind, and a lover of the French language, he made friendships among the French colony and was appointed counselor to the French Embassy His efficient services brought him to the notice of the Marqués de Grimaldi, the Prime Minister, who made the young lawyer his private secretary. Later he was appointed a judge of the King's Court In 1761 he was sent to Mexico as *visitador general* to investigate the abuses in the colonial administration Possessing ample powers, he settled the dispute between the Viceroy and the Audiencia over prerogative by siding with the Viceroy, removed the complaints of the miners by bettering the mining regulations, and restored tranquillity among the discontented colonists by promising reforms In 1764 his powers as *visitador* were made almost unlimited, and. working in harmony with the new Viceroy Marqués de Croix, he introduced beneficial reforms in the financial system and visited many parts of the viceroyalty remedying

abuses In 1767 he went to Sonora to settle the Indian troubles, reform the Missions of Lower California, and provide for further colonization in the northwest Under his direction the expeditions were fitted out, in 1769, which made the first settlements in Upper California Returning to Spain in 1774, he was rewarded for his labors by the King, despite the complaints lodged at the court by his enemies He was made President of the Council of Indies and in 1776 was chosen Minister of Indies Because of his knowledge of colonial affairs he was able to introduce many reforms in their administration In 1778 he issued a decree extending greater freedom to commerce, opening many ports in Spain and the Indies, and in 1782–86 he put in force the *Ordenanza de Intendentes*, which provided for a reorganization of the colonial administration, abolishing the *alcaldes mayores* and *corregidores* and their abuses In 1786 he was created Marques de la Sonora He was one of the ablest ministers of the enlightened despot Charles III (q v), and Spain's greatest colonial administrator The Gálvez family built a school and a church for their native town, and the remains of Joseph de Gálvez lie in the burial vault under the church His *Informes* as *visitador* in Mexico exist in manuscript in the Archivo de Indias and in the Bancroft collection of the University of California, the *Informe general* was published in Mexico (1767) No life of Gálvez has yet been published

GALWAY, gal'wā A maritime county of Connaught, Ireland, and, after Cork, the largest of the Irish counties (Map Ireland, B and C 5) It is bounded on the east by the Shannon and its affluent the Suck, and on the west by the Atlantic Ocean Area, 2372 square miles, of which bog and marsh make up about 15 per cent In the west is the mountain land, including Joyce's Country, Jar Connaught, and Connemara, one of the wildest and most mountainous districts in Ireland, while most of the east is plain extending to the banks of the Shannon Between the two parts lie Lough Corrib and Lough Mask The coast line is about 400 miles in length, and the shore, much broken, is fringed with numerous islands Copper is the only mineral of importance Agriculture and fishing are the leading pursuits, production of kelp is large; and woolens, linens, friezes, and felt hats are manufactured Chief towns, Galway, the capital, Ballinasloe, Loughrea, and Tuam Pop, 1841, 440,700, 1851, 322,430, 1901, 192,549, 1911, 182,224

GALWAY The capital of Galway Co, Ireland, a municipal and parliamentary borough, seaport, and civic county at the mouth of the Corrib on the north shore of Galway Bay, 50 miles north-northwest of Limerick, and 130 miles west of Dublin (Map· Ireland, B 5) It is built on both sides of the river, and on two islands in its channel, its parts being united by two bridges It is connected with Lough Corrib by a canal and forms the terminus of the Midland Great Western Railway Galway has numerous flour and other mills, brush and bag factories, and breweries, distilleries, foundries, works for polishing marble, salmon and sea fishing, and a good harbor It exports agricultural produce, wool, bacon, fish, kelp, and a fine black marble, and imports grain, timber, petroleum, and manure The old town of Galway is poorly built and irregular, many of its older houses have a Spanish appearance One, known as Lynch's Castle, marked with a skull and cross-bones, was the residence of James Lynch Fitzstephen, a mayor of Galway, who in 1493 condemned his son to death for murder and to prevent his rescue caused him to be hanged from his own window The new town consists of well-planned and spacious streets, built on rising ground, which slopes gradually towards the sea and the river Claddagh, a suburb, is inhabited by fishermen, who once excluded all strangers from their society and married solely within their own circle These fishermen spoke the pure Irish language, and the Irish costume was worn by the women They annually elected a "mayor," whose function was to administer the laws of their fishery and to superintend all internal regulations, but all such customs slowly died, though vestiges still remain Attached to the Anglican diocese of Tuam, Galway is also a Catholic episcopal see Chiefly interesting is the parish church of St Nicholas, founded in 1320 and built in the form of a cross Other interesting buildings are St Augustine's Catholic Church, three monasteries, and five nunneries, the county courthouse, barracks, and University College The last named was founded as Queen's College in 1845, but charter and name were changed by the Irish Universities Act in 1908 It has about 140 students The town returns one member to Parliament

Galway was taken by Richard de Burgo in 1232, and the ancestors of many of the leading families resident in this quarter settled here about that time It rose in commercial importance through its Spanish trade, from the thirteenth to the middle of the seventeenth century During the latter century it suffered for its adherence to the Royalists In 1652 it was taken by Sir Charles Coot after a blockade of several months, and in July, 1691, it was compelled to surrender to General Ginkell Pop, 1901, 13,426, 1911, 13,255 Consult Hardiman, *History of the Town and County of Galway* (Dublin, 1820)

GALWAY BAY An inlet of the Atlantic Ocean, on the west coast of Ireland, between the counties of Galway and Clare (Map Ireland, B 5) It is 30 miles long from west to east, with an average breadth of about 10 miles The islands of Aran form a natural breakwater at its entrance between the north and south sounds There are lighthouses on Inisheen, Mutton, Eeragh, and Straw islands, and at the entrance to Galway docks

GALYZIN, ga-lōt'sēn See GOLITZIN

GAMA, ga'ma, DOMICIO DA (1862–1925) A Brazilian diplomat, born at Ponta Negra, Rio de Janeiro He began his career in newspaper work, serving as Paris correspondent of the *Gazeta de Noticias* in 1887–88 He quickly won recognition as a writer, being a regular contributor to Brazilian and foreign magazines In 1893 he was secretary of the special commission on the Argentine-Brazil boundary dispute, which was arbitrated by President Cleveland Later he was sent on special missions to Bern and Paris and in 1900 was associated in the Brazil-Guiana boundary question He was appointed chargé d'affaires at Brussels in 1901, Minister to Peru in 1907, Minister to Argentina in 1908, and Minister to the United States in 1911 In 1914 he was a member of the A B C (Argentina, Brazil, Chile) Mediation Conference between the United States and Mexico.

GAMA, ga'ma, José Basilio da (1740–95) A Brazilian poet, born at São José (Minas Geraes) He became a novice in the Jesuit College at Rio de Janeiro Upon the expulsion of the order in 1759, he continued his studies at the seminary of São José, and subsequently went to Portugal and then to Rome, where in 1763 he was admitted as a member of the literary circle known as the *Arcadia* Having returned by way of Portugal to Rio de Janeiro, he was there denounced as a Jesuit and was sent to Lisbon on a ship of war Here he openly declared against the Jesuit Order, found a patron in Pombal, the Portuguese statesman, wrote an ode celebrating the dedication of an equestrian statue of José I, was elevated to the nobility in 1771, and in 1774 received an official post in the Ministry of Foreign Affairs When his protector was dismissed from office in 1777, he proceeded to Rio de Janeiro, where he organized an *Arcadia Ultramarina*, in imitation of that at Rome This society having been dissolved in 1790 by the new Viceroy, the Count of Rasende, who suspected plots, and its members having been threatened with imprisonment, Da Gama returned to Lisbon and there lived in retirement until his death His chief work, which enjoyed high popularity in Brazil, is the epic *O Uraguay* (1769), in which he endeavors to show that the Jesuits of the Seven Missions sought to found in Uruguay an independent theocratic state He also wrote shorter poems entitled *Declamação tragica*, *Quitubia*, and *Cantico aos Campos Elysios*

GAMA, Luiz Felipe Saldanha da (1841–95) A Brazilian naval officer and diplomat, born in Rio de Janeiro After years of service in the navy, he reached the rank of rear admiral He fought in the war against Paraguay (1865–70) and later was sent to China and Japan to establish friendly relations between those nations and Brazil In 1889 he attended the International Marine Conference at Washington In 1893, while at the head of the naval school, he joined the naval revolt against the government Upon the failure of the rebel cause he escaped on board a Portuguese war vessel to Buenos Aires (January, 1894) Later he joined the revolt in Rio Grande do Sul, and after a defeat of the rebel forces he took his own life (June, 1895)

GAMA, ga'ma, Vasco da (c 1460–1524). A Portuguese navigator and the first European to reach India by the maritime route round Africa He was descended from a noble family and was born at Simes, a small seaport of Portugal After some years at court he was chosen to command the expedition dispatched by King Emmanuel to India by the all-sea route, the possibility of which had been revealed by the rounding of the Cape of Good Hope by Bartholomeu Dias in 1488, and confirmed by the explorations of Covilhão, who had reached India by way of the Red Sea and had crossed the Indian Ocean from Goa to Sofala Vasco da Gama sailed from Lisbon July 8, 1497, and, doubling the Cape of Good Hope in November, reached in December the Rio do Infante, the farthest point attained by Dias There he had to suppress a mutiny of his sailors, who shrank from facing the unknown dangers that awaited them They breasted the strong Agulhas current and on Christmas Day, 1497, sighted the coast, which Da Gama, in honor of the day, named Natal (*dies Natalis*). Past Delagoa Bay, Quilimane, and Mozambique they sailed, until, on April 15, they anchored off Malindi, where they took on board an Indian pilot, a native of Gujarat A voyage of 23 days across the Indian Ocean brought the vessels to the coast of Malabar, which was sighted on May 17, 1498 The ruler of Calicut did not receive the Portuguese very favorably, and Da Gama was forced to fight his way out of the harbor when he started homeward He rounded the Cape once more in March, 1499, and on September 8 reached Lisbon A fleet was immediately dispatched for India under Pedro Alvarez Cabral, whose ships were driven out of their course westward, the discovery of Brazil being the result In 1502 Da Gama sailed again for India, planting Portuguese colonies on the way at Mozambique and Sofala On reaching Calicut he bombarded the place, destroyed the fleet of the Rajah and forced him to conclude peace In December, 1503, he was back in Portugal with a fleet bearing rich cargoes and was received with great honor and given the titles of Count Vidigueira and Admiral of the Indies For 20 years Da Gama saw no active service In order to reform the abuses in the administration of Portuguese Asia, the King appointed him Viceroy in 1524, and he was dispatched with a fleet to India, but soon after his arrival he died at Cochin on Christmas Day, 1524 The fame of Da Gama is due, perhaps, less to the merit of his exploits than to the place assigned him by Camões in his epic, *Os Lusiadas* Consult Correa, *The Three Voyages of Vasco da Gama and his Viceroyalty* (Hakluyt Society Publications, London, 1869), *Roteiro da viagem que em descobrimento da India pelo cabo de Bõa Esperança fez Dom Vasco da Gama em 1497–1499* (trans by Ravenstein, Hakluyt Society Publications, London, 1898), Teixeira de Aragão, *Vasco da Gama e a Vidigueira* (3d ed, Lisbon, 1898), Cordeiro *Os primeiros Gamas* (ib, 1898), Jayne, *Vasco da Gama and his Successors, 1460–1580* (London, 1910)

GAMA (ga'ma) **GRASS**, or **SESAME** (sĕs'a-mē) **GRASS** (*Tripsacum*). A genus of grasses indigenous to America, sometimes said to be named from the Spanish gentleman who first attempted its cultivation in Mexico Only two or three species are known, of which the gama grass (*Tripsacum dactyloides*), occurring from Connecticut to Mexico and southward, is distinguished by usually having two or three spikes together. It produces a large quantity of coarse fodder, for which it is cultivated, not only in Mexico, but in the United States and to some extent in Europe In favorable circumstances it yields a very abundant crop and attains a height of 9 or 10 feet, its root leaves measuring 6 feet in length It possesses what for some climates is an almost invaluable property of enduring excessive drought without injury, but suffers from frost It seems eminently adapted to the climate of Australia *Tripsacum fasciculatum*, a native of Mexico, attains a height of 15 to 20 feet Consult W J Beal, *Grasses of North America* (2 vols, New York, 1887–1900), and M E Francis, *Book of Grasses* (ib, 1912)

GAM'ALA An ancient fortress of Palestine, situated on the Lake of Tiberias and supposed to be either the modern *El-Hussu* or *Khan-el-akbah* In the Jewish war of 66–70 Gamala, which had been fortified by Josephus, was vainly besieged by Agrippa, but was finally taken by

Vespasian, who slaughtered 9000 of the defenders

GAMALIEL, ga-mā'lĭ-ĕl (Heb, 'God is a reward') 1 GAMALIEL I A noted Pharisee, twice referred to in the Book of Acts (1) in v 34–39, where, as a member of the Sanhedrin, he counseled, from the point of caution, moderate measures regarding Peter and the other Apostles, and (2) in xxii 3, where Paul speaks of him as his instructor in the law Jewish tradition identifies him with the famous Rabbi Gamaliel, the elder, the son of Simon and the grandson of Hillel, the founder of the more liberal of the two Pharisaic schools This Gamaliel was the first of the seven Jewish doctors who received the honored title of Rabban, as president of the highest religious council of the Jews, and was held in such reputation that when he died, according to Mishna (Sota ix. 15), "reverence for the law ceased, and purity and piety died away" At the same time, in Gamaliel's day, instruction in the law was much more in sympathy with the spirit of practical life than was the case in the time of the later law schools of Palestine and Babylon In fact, Gamaliel himself at several points modified the restrictive customs of Jewish exclusivism and Jewish Sabbatism, while he protected the interests of wives in the matter of divorce and the interests of fatherless children in the matter of inheritance. He was even liberal enough to be a student of Greek literature, which was held in abhorrence by narrow-minded rabbis In view of these facts it is not difficult to understand his tolerant position in the Sanhedrin council of Acts v, though it is to be doubted whether any appreciation of Christianity entered into his motives, the legend of his subsequent conversion to the Christian faith being worthless It is also not difficult to understand the attraction to him of Saul of Tarsus, and the fact that Saul afterward became a persecutor should not be made a ground for denying the historicity of the narrative in Acts v or the actuality of any relations between him and Saul Gamaliel died evidently some time before 70, since his son Simon was then in public life, while he himself seems to have been forgotten Many traditions are ascribed to him which belong to his grandson, Gamaliel II, with whom he is constantly confused

2 GAMALIEL II Grandson of the preceding, and the leading personality among the Jews of Palestine from c 80–110 A D He labored hard to unify the Palestinian Jews after the terrible struggle with Rome He succeeded Johanan ben Zakkai as head of the learned council of Jabneh, which had replaced the old Sanhedrin of Jerusalem He was a strong, just, and determined man, yet of a remarkably liberal spirit towards Gentile culture For both of these men, consult W Bacher's article in the *Jewish Encyclopædia*, vol v (New York, 1901–06); Schurer, *Geschichte des judischen Volkes*, vol. ii (Leipzig, 1907), H Strack, *Einleitung in den Talmud* (ib, 1908).

GAMARRA, ga-mar'ra, AGUSTÍN (1785–1841) A Peruvian soldier and politician, born at Cuzco He was educated at the College San Buenaventura Entering the Spanish army, he attained the rank of lieutenant colonel, in 1821 he joined the revolutionary cause, and became general and then grand marshal In 1829, after the deposition of General Lamar, he was inaugurated as President of Peru In 1834, after the close of his rather unsuccessful administration, he led an insurrection against his successor, Orbegoso, afterward escaping to Bolivia Subsequently he fought under Santa Cruz (q v) and Salaverry, and in 1835 was banished by the latter to Costa Rica for an attempt to incite revolt When war was declared between Chile and the Peru-Bolivian Confederation formed by Santa Cruz, he commanded the reserve of the Chilean army sent to invade Peru, and after the defeat of the troops of the Confederation in 1839, near Yungay, was declared provisional President He was elected constitutional President by Congress with the title of "Restorer," and obtained the abolition of the liberal constitution of 1834 In 1841 he declared war against Bolivia, commanded the army of invasion, and was killed at the defeat of Yngavi (November 20) Despite frequent tyrannical acts, he sought the progress of his country and dictated many beneficial decrees In 1849 a mausoleum was erected in his honor in the Pantheon of Lima

GAMBA, gam'ba, BARTOLOMMEO (1776–1841). An Italian bibliographer, born at Bassano, who gave himself entirely to the study of the literature of Italy For many years he was vice librarian of St Mark's, Venice He was a member of many academies His most important work is the *Serie dei testi di lingua* (1805, 4th enlarged ed, 1839), which contains the bibliography of the authors mentioned in the dictionary of the Academy of Crusca and that of the best editions of other authors from the fifteenth century to the beginning of the nineteenth Other works are *Galleria dei letterati ed artisti delle provincie venete nel secolo XVIII* (1824), *Vita di Dante* (1825), *Catalogo delle più importanti edizioni della Divina Commedia* (1832), and *Bibliografia delle novelle italiane in prosa* (1833) He also made an excellent translation of Don Quixote

GAMBARELLI, gam'ba-rĕl'lē The family name of five brothers, who were architects and sculptors in Rome during the early Renaissance The two foremost, Antonio and Bernardo, are best known by their surname, Rossellino (q v).

GAM'BELL See ST LAWRENCE ISLAND, ALASKA

GAM'BESON, or WAMBAIS (AS *wamb*, from OF *gambeson, wambaison*, from ML. *gambeso, wambasium*, from OHG, Goth *wamba*, stomach, Eng *womb*) In mediæval armor, a protection for the body, composed of layers of cloth, tow, or similar material, quilted on a lining canvas or leather It was worn by the infantry as their only defense and by knights under their mail shirts It is the most ancient of all armor and was used by the ancient Egyptians. Consult Ashdome, *Arms and Armour* (New York, 1909), and Demmin, *Arms and Armour* (London, 1877)

GAMBET'TA, *Fr pron* gaN'bā'ta', LÉON (1838–82). A French statesman He was born April 3, 1838, at Cahors, of a family which had come originally from Genoa, and which is said to have been of Jewish origin In 1854 an accident caused the loss and removal of his left eye In 1859 he began the practice of law at Paris His first great success, however, did not come until 1868, when he attacked the coup d'état of 1851 while defending a journalist who had come under the ban of the Empire He was returned to the Chamber of Deputies from Paris and Marseilles in the elections of 1869, and on

May 5, 1870, he delivered a speech containing a panegyric of the republican form of government, which attracted great attention After the disaster of Sedan and the fall of the Empire, he became Minister of the Interior in the provisional government and remained for some time in Paris after it was invested by the Germans It was he who announced the fall of the Emperor and the establishment of the Republic In order to arouse the provinces he escaped from the city in a balloon (October 7), proceeded to Tours, and established a virtual dictatorship He urged his countrymen to fight to the bitter end and denounced the capitulation of Metz as an act of treason on the part of Marshal Bazaine He left France and went to Spain as a protest against the treaty signed with Germany When a National Assembly was resolved upon in 1871, Gambetta sought to give it an exclusively republican character by a decree directing that no official of the Second Empire should take part in the election The decree was canceled at the instigation of Prince Bismarck, and Gambetta resigned office, Feb 6, 1871 He subsequently entered the Assembly as a member for Paris and became the leader of the Extreme Left, violently attacking the monarchical parties After the retirement of M. Thiers his political action became more moderate The Republicans owed to his leadership their success in the elections of 1877, and their defeat of the attempts of the Conservatives to deprive them of its results In the same year he was twice prosecuted for violence of speech and once condemned to imprisonment He strongly attacked the clerical party, who wanted to restore the temporal power of the Pope On the election of Jules Grévy to the presidency of the Republic in 1879, Gambetta became President of the Chamber of Deputies (January 31)

Upon the fall of the Ferry ministry in November, 1881, Gambetta was asked to form a new cabinet Prevented by Léon Say and others from bringing the various factions of the Republic together by giving the representatives of each a place in the ministry, he startled the nation by a selection which it could not but regard with apprehension and alarm The Roman Catholics were directly insulted by the choice of Paul Bert, an open skeptic, as Minister of Public Worship The Conservatives, agitated by his proposed curtailment of the powers of the Senate, joined with the Church in opposing his policy The Extreme Left also had reasons for opposition At an early date Gambetta reintroduced his favorite schemes of *scrutin de liste* (q v) and senatorial abridgment. The Lower Chamber was to share in the election of senators, and the vote of the latter upon financial measures was to be taken away The *scrutin de liste* was defeated in the Senate, and Gambetta immediately resigned (Jan 14, 1882) Although his influence over national affairs was still felt through his newspaper, the *République Française* (established 1871), he seldom appeared in public after his resignation The Republicans, who had not wholly trusted him while in power, were thrown into confusion by the news of his death, as it deprived them of the one man whose strong opposition the Royalist and Bonapartist factions especially feared A pistol wound in the hand aggravated a malady from which he had long suffered, and he died Dec 31, 1882 Gambetta's *Discours et plaidoyers* have been edited in 11 volumes by Reinach (Paris, 1881–85) Consult Reinach, *Léon Gambetta* (Paris, 1884), Harrison, *Léon Gambetta, a Positivist* (London, 1892), Coubertin, *The Evolution of France under the Third Republic* (trans by Hapgood, New York, 1897) Tourneur, *Gambetta en 1869* (Paris, 1904), Ghensi, *Gambetta Life and Letters* (London, 1910) See FRANCO-GERMAN WAR

GAM'BIA A British colony in West Africa at the mouth of the river of the same name (Map Africa, C 3) Its area is only 69 square miles, but territory under British protection extends some 250 miles up the river, and the total area is stated at 4500 square miles with a population in 1911 of 138,400 Since 1902 all of the Gambia except St. Mary's Island has been under the protectorate system of administration, the island comprises about 2500 acres, with 8807 inhabitants The population of the Gambia is chiefly negro and Mohammedan The capital and principal town is Bathurst (q v), on St Mary's Island Imports and exports (including bullion and specie) amounted to £303,615 and £248,140 respectively in 1902, in 1912, £756,853 and £735,172 (bullion and specie, £285,223 and £196,579) The only important export of merchandise is ground nuts, amounting in 1911 to £437,472 and in 1912 to £502,069 Gambia was included in the British West African settlements from 1866 until it was constituted a separate colony in 1888 Consult F. B Archer, *The Gambia Colony and Protectorate* (London, 1906), and H F Reeve, *The Gambia Its History, Ancient, Mediæval, and Modern* (ib, 1912)

GAMBIA (African *Ba-diman, Fouret*) A river of West Africa, rising in the mountains of Futa Jallon, Senegal, and flowing through the British Colony of Gambia (q v) (Map Africa, C 3) It falls into the Atlantic at Bathurst by a wide estuary There is a bar a short distance from its mouth, which obstructs navigation at low tide The river rises 150 miles from the sea, but follows so sinuous a course that its length is about 700 miles The lower part of the river flows through mangrove swamps Seagoing steamers ascend as far as Fort George, about 170 miles, while lighter vessels reach the Barraconda Rapids, about 220 miles from its mouth The river incloses a number of islets

GAM'BIER. A village in Knox Co, Ohio, 50 miles northeast of Columbus, on the Cleveland, Akron, and Columbus Railroad (Map Ohio, F 5) It is the seat of Kenyon College (q v), Harcourt Place School, for girls, and Bexley Theological Seminary Pop, 1900, 751, 1910, 537

GAMBIER See GAMBIR

GAMBIER, JAMES, LORD (1756–1833). An English admiral He was born at New Providence, Bahamas, Oct 13, 1756, while his father was Lieutenant Governor of the islands He entered the navy in 1767, was post captain in 1778, and in 1780 took part in the capture of Charleston, S C He commanded the *Defence* in the battle off Ushant, June 1, 1794, and was the first to break through the French line He received a gold medal for his services and was made colonel of the marines The following year he became rear admiral and Lord of the Admiralty In 1799 he was made vice admiral In 1802 he was appointed Governor of Newfoundland and commander in chief of the naval station In 1804 he returned to the Admiralty, and in 1805 attained the rank of ad-

miral For his share in the bombardment of Copenhagen and the capture of the Danish navy in 1807 he was raised to the peerage as Lord Gambier In command of the Channel fleet he blockaded the French fleet in Aix Roads, but did not support Cochrane, Lord Dundonald, whom the Admiralty had deputed to destroy it. When Cochrane complained, Gambier demanded a trial and received a qualified acquittal by a friendly court-martial As a chief commissioner, he took part in the peace negotiations of the United States at Ghent in 1814 and for this service was honored with the G C B In 1830 he was promoted to be admiral of the fleet He died April 19, 1833

GAMBIER ARCHIPELAGO. An unimportant group of 10 islets in the south Pacific, lat 23° 8′ S, long 134° 55′ W, discovered by Wilson in 1797 They rest upon the south end of the extrusion mass which constitutes the Tuamotu and are of moderate elevation, on Mangareva the two peaks of Mokoto and Mangareva measuring about 1300 feet in altitude The four largest islands are Mangareva, Aokena, Taravai, and Akamaru, and these are the only spots inhabited The area of the land surface of the group is about 10 square miles A census in December, 1911, records the population at 529, vital statistics covering the 15 preceding years show 245 births and 286 deaths In recent years Mangareva has received a considerable colony from Easter Island The population is a mixture of the elder and the junior branches of the Polynesian race and finds its closest affinity with the people of the Tuamotu, it is singular as being the only Polynesian people which has lost the art of canoe craft The rich soil affords abundance of coconuts and other fruits, coffee has been planted with satisfactory success, several banks of pearl shell are known to exist in the lagoons The Gambier Archipelago is a part of the French possessions and is administered from Papeete The chief village is Rikitea. Consult Churchill, *Easter Island, the Rapanui Speech, and the Peopling of Southeast Polynesia* (Washington, 1912)

GAM'BIR, or GAMBIER (Malay), *Terra japonica* A crystalline plant extract similar to catechu (q v) Like catechu, it is largely used in tanning and dyeing, for the production of "catechu brown" on cotton "khaki," fast to light and washing. It is occasionally used in medicine as an astringent It can be obtained from the leaves and young twigs of *Uncaria gambir*, which is extensively cultivated at Singapore. To prepare it, the leaves and twigs are extracted in boiling water, the solution is strained and evaporated to a thick sirup, cast into small cubes, and allowed to harden

GAM'BIT See CHESS

GAM'BLE, FRANCIS CLARKE (1848–). A Canadian civil engineer He was born in Toronto and was educated privately and at Upper Canada College He began work as a civil engineer in 1869 in connection with the Intercolonial Railway, became assistant engineer of the Great Western Railway in 1872, and was assistant engineer of the Intercolonial and Canadian Pacific railways during construction In 1881 he became assistant engineer for the Department of Public works of British Columbia, and in 1887–97 he was resident engineer and agent, in 1898–1911 public-works engineer and inspector of dikes, and after 1911 chief engineer and inspecting engineer of railways. He was elected a member of the Canadian Society of Civil Engineers in 1887, and in 1891 of the Institute of Civil Engineers, London, England, and of the American Society of Civil Engineers

GAM'BLE, HAMILTON ROWAN (1798–1864) An American statesman, "War" Governor of Missouri He was born at Winchester, Va, studied at Hampden-Sidney College, was admitted to the Virginia bar, and in 1818 removed to Missouri, where in 1823 he was elected Secretary of State He acquired an extensive legal practice at St Louis and became presiding judge of the State Supreme Court He was elected in 1861 to the Missouri Constitutional Convention, and when on July 31 that body established a provisional government, he was appointed Governor to replace Claiborne F Jackson, who had joined the Secessionists In 1862 he issued an order commanding the enrollment of the total fighting population, and giving authority to General Schofield to place in active service a force adequate to the maintenance of peace This order occasioned an uprising among the partisans of the South, who looked upon it as a draft measure and believed that in having given oath not to take up arms against the State or Federal government they had become noncombatants On June 15, 1863, at his summons, a convention assembled which adopted an ordinance providing for a method of gradual emancipation of slaves This did not satisfy the ultra-Republicans, who demanded an immediate emancipation, and thereby gained the election of November, 1864 He died in office

GAM'BLING, or **GA'MING** (from AS. *gamenian, gamen, gomen,* game, sport, joy) The art or practice of playing a game of hazard, or one depending partly on skill and partly on hazard, with a view to pecuniary gain Games of this nature were forbidden by the Romans, both under the Republic and the Empire The ground on which this was done was the tendency of such practices to render the Roman people effeminate and unmanly It devolved upon the ædiles to protect the public interest by punishing violations of the gaming laws During the Saturnalia, which was a period of general license, games of chance were permitted, and a like indulgence was extended to old men at all times both among the Greeks and the Romans This vice has not been confined to civilized nations, either in the ancient or the modern world; Tacitus mentions its existence among the ancient Germans, and it is known to prevail among many half-civilized and even savage tribes at the present day.

It is remarkable that in England, as in Rome, the ground on which gambling was first prohibited was not its demoralizing, but its effeminating, influence on the community The Act 33 Henry VIII, c 9 (1541), had in view the double object of "maintaining artillery and debarring unlawful games" At a much later period and on broader grounds of public policy were enacted the statutes 16 Chas II, c 7, and 9 Anne, c 14, the latter of which declared that all bonds or other securities given for money won at play, or money lent at the time to play with, should be utterly void, and all mortgages or incumbrances of lands made on the same consideration should be made over to the use of the mortgagor Such continued to be the law till 1845, when there was passed the Act 8 and 9 Vict., c 109,

which, though it repealed the obsolete provisions of 33 Henry VIII and 16 Chas II and 9 Anne, reenacted the former prohibitions against card playing and other games of chance, and was followed up (in 1853 and 1854) by the acts for suppressing betting houses (16 and 17 Vict, c 119) and gaming houses (17 and 18 Vict, c 38). By 8 and 9 Vict, c 109, the common law of England was altered, and wagers, which with some exceptions had hitherto been considered legal contracts, were declared to be no longer enforceable in a court of law This prohibition does not affect contributing to prizes for lawful games In Scotland an opposite rule had been followed, the judges having held, irrespective of the character of the game, or of any statutory prohibition regarding it, that "their proper functions were to enforce the rights of parties arising out of serious transactions, and not to pay regard to *sponsiones ludicras*" But partial assimilation has now been effected in this respect between the laws of the two countries by a statute which also provides that cheating at play shall be punished as obtaining money under false pretenses The mode of enforcing the Act 8 and 9 Vict, c 109, was defective, and the Act 17 and 18 Vict, c 38, put heavy penalties on those who obstructed the police by putting chains or bolts against the doors of gaming houses or otherwise delaying the entry into such houses, and any apparatus or arrangement for giving alarm to the persons inside was declared to be evidence that the house was a gaming house The Summary Jurisdiction Acts of 1879 and 1884 have provided effective remedies against the violators of gaming laws The Betting-Houses Act (16 and 17 Vict, c 119) was passed to put down another kind of gaming, viz, in houses where money is received as or for the consideration for any undertaking to pay money in the event of any horse race, or other race, fight, game, sport, or exercise All such betting houses are declared to be gaming houses within the Statute 8 and 9 Vict, c 109, and similar powers of search may be resorted to But nothing in the act extends to a person holding stakes to be paid to the winner of any race or lawful sport, game, or exercise Besides these statutes, the Intoxicating Liquors Licensing Act of 1872 puts a penalty on the keeper of any house for the sale of liquors allowing any gaming for money or money's worth on the premises By the vagrant acts all persons are liable to penalties for playing at games on a public highway or public place These enactments do not interfere with gaming in private houses

In most of the states of Germany gaming was allowed, and the extent to which it was practiced at the German watering places is well known The princes of the petty states often derived a large portion of their revenue from the tenants of their gaming establishments, whose exclusive privileges they guaranteed Recently these German gaming tables have all been closed Monaco has now the chief public gaming tables of Europe.

In the United States, as in England, one who keeps a gaming house is indictable at common law for maintaining a nuisance; and one who wins another's money with false dice, or the like, is punishable as a common-law cheat Legislation in our States against gambling has taken a course similar to that above described in Britain. The tendency has been towards greater precision in defining the offenses of gambling and of keeping gambling houses and implements, towards more summary methods of dealing with the violators of these statutes, and towards severer punishment of violators Such legislation is so diverse in matters of detail as to render even an outline of it impracticable There has been difficulty in arriving at a correct definition of gambling It cannot be said that a mere contest of skill or strength, however great may be the prize, is indictable at common law, for in England and the United States such contests have at all times been sanctioned by public policy and protected by the courts Of course there may be contests not objectionable upon this ground which may be prohibited for other reasons, as, e g, cockfighting, which is properly regarded as a cruel and wanton sport, but it is "gaming" for persons to stake money on chance The chance must be the controlling factor in the game It is not enough that chance should enter into a contest to make it gambling, for it cannot be denied that there is a certain element of fortune in almost any contest or undertaking But this does not make such contest gambling All competitive examinations are affected somewhat by chance, yet no competitive examination is gambling So in games of skill, as chess and billiards In such games chance may have very little part If so, playing these games, even for a prize or reward, is not gambling It is otherwise when the game depends more largely on chance than on skill, so that it may be said that gambling as a penal offense may be defined as a staking on chance. Consult. *Encyclopædia of the Laws of England* (London, 1897–98), Bishop, *On Statutory Crimes* (3d ed, Chicago, 1901), Rowntree, *Betting and Gambling* (New York, 1905), Coldridge and Hawksford, *The Law of Gambling, Civil and Criminal* (London, 1913)

GAMBOA, Pedro Sarmiento de See Sarmiento

GAMBOGE, găm-bōj′ *or* -bōōj′, or **CAMBOGE** (from *Camboja, Cambodia*, Skt *Kambōja*, where the tree abounds) A gum resin brought from the East Indies and believed to be the produce chiefly of *Garcinia cambogia*, also known as *Garcinia cambogioides*, a tree of the natural order Guttiferæ, a native of Ceylon, Siam, Cambodia, etc The gamboge tree attains a height of 40 feet, has smooth oval leaves, small polygamous flowers, and clustered succulent fruit When the bark of a tree is wounded, gamboge exudes as a thick, viscid, yellow juice, which hardens by exposure to the air The finest gamboge comes from Siam *American gamboge*, which is very similar and used for the same purposes, is obtained from *Vismia guianensis* (natural order Hypericineæ), a native of Mexico and Surinam Gamboge occurs in commerce in three forms (1) in rolls or solid cylinders, (2) in pipes or hollow cylinders, and (3) in cakes or amorphous masses The first two kinds are the purest Good gamboge contains about 70 per cent of resin and 20 per cent of gum, the remainder being made up of woody fibre, fecula, and moisture The resin of gamboge, known as gambogic acid, is a bright yellow substance soluble in alcohol and in ether. Its composition is represented by the formula $C_{40}H_{22}O$ It is much used by painters to produce a beautiful yellow color It is also employed for staining wood and for making a gold-colored lacquer for brass. It has a shelly fracture, is destitute of smell, and has an acrid

taste If taken internally, it acts as a cathartic, producing a large amount of secretion It is but rarely used in medicine, and never alone, as it causes griping and irritation of the alimentary canal See MANGOSTEEN, GUMS

GAMBRI'NUS. A mythical king of Flanders, to whom is ascribed the invention of beer His figure is familiar in German beer cellars and elsewhere, seated astride a cask with a tankard in his hand The name is said to have arisen out of that of Jan Primus, Duke of Brabant (1251–94) He obtained the presidency of the Brussels guild of brewers, and his portrait, with a foaming glass of beer in his hand, was hung up in the hall of the guild The name may perhaps have been converted into German, the prince of the story made a king, and the invention of beer ascribed to him But this explanation may itself have been a fiction

GAME See HUNTING

GAME FOWL. See FOWL, COCKFIGHTING

GAME LAWS Statutes enacted either for the purpose of protecting persons in the enjoyment of certain sporting rights or of protecting game from improper destruction

Previous to the Norman Conquest of England there were no restrictions against the hunting of game, except a general law prohibiting the hunting of game on Sundays, so far as is known this was the earliest game law A subsequent law prohibited monks hunting in the woods with dogs All other classes of society were at liberty to hunt over the country at large, except that the King's hunting was not to be interfered with, i e, wherever the King elected to hunt, all others had to vacate until the King and his followers had passed With the advent of the Normans in 1066, hunting became the sole privilege of the nobles, and the common people were prohibited, under severe penalties, from the hunting of game Stringent game laws were enacted, which became known as the Forest Laws, and which frequently drove the Saxons, and common people generally, into rebellion. Many of them, as in the case of the historic Robin Hood, became outlaws. During the Middle Ages the game laws of England were framed so as to secure to the landed aristocracy the exclusive right of taking game Under their provisions, according to Blackstone, 'All persons of what property or distinction soever, that kill game out of their own territories, or even upon their own estates, without the King's license expressed by grant or franchise, are guilty of the offense of encroaching on the royal prerogative And those indigent persons who do so without having such rank or fortune, as is generally called a qualification, are guilty not only of this offense, but of the aggravations also created by the statutes for preserving game" One of the "qualifications" for killing game in Blackstone's time was the ownership of a freehold estate of £100 per annum, "there being fifty times the property required to enable a man to kill a partridge," remarks the great commentator, "as to vote for a Knight of the Shire" Early in the last century all the old statutes on the subject were repealed, and the Night Poaching Act, 1828 (9 Geo. IV, c 69), and the Game Act, 1831 (2 Wm. IV, c 32), were substituted for these

In the United States game laws have been framed on different lines from those of England Their primary object has been the protection of game itself, not the grant of exclusive rights to persons possessed of large property qualifications In 1623 Plymouth Colony declared fowling, fishing, and hunting to be free, except on certain private property Class legislation is dead, all wild game and fishes are the property of him that reduces them to possession by killing or catching, with due regard to the law of trespass on private property, be it land or water, wild game and fishes must not be molested during the season of reproduction, and they must be allowed free and unobstructed passage to their breeding grounds or waters

The rule governing the acquisition of property in game in the United States differs in some respects from that in England There, if a hunter captures game upon the land of another, it belongs to the landowner, while here it belongs to the captor, although he may be liable to an action for trespass, and in some States to a criminal prosecution, for entering upon the premises of another without permission By the common law the right of fishing in the sea and in tidewaters generally is public and common to every person, but the owners of lands on the banks of fresh-water rivers above the tide line have the exclusive right of fishing to the middle of the stream If the same person owns lands on both sides of the river, he has the sole right of fishing in the river as far as his lands extend So the sole right of fishing in ponds or lakes belongs to him who owns the fee of the soil beneath the water Moreover, a person rightfully navigating a river becomes a trespasser when he shoots at or kills wild ducks thereon, in case the bed of the river is the property of adjacent landowners

This right of fishery, however, is not an absolute or unqualified right of property It is subject to the police power of the State Persons may be prohibited by legislation from fishing or hunting even upon their own lands, during certain seasons, and their sale of game which has been killed during the open season may be regulated. This rule rests upon the doctrine that the wild game within a State belongs to the people in their collective sovereign capacity It is the subject of private ownership only so far as the people may elect to make it so, and they may absolutely prohibit the taking of it, or the traffic and commerce in it, if this is deemed necessary for the protection or preservation of the public good. Hence State laws prohibiting the citizens of other States from planting oysters within the tidewaters of the enacting State are constitutional So are laws regulating the catching of fish within the bays of the enacting State, or prohibiting the catching of fish or the killing of game for the purpose of carrying the same beyond the limits of the State All State laws having for their object the protection of game from unnecessary slaughter, and the propagation of game, have been treated with favor by both State and Federal courts and have received a liberal construction Indeed, the Supreme Court of the United States has not hesitated to declare that it is the duty of the Legislature to enact such laws as will best preserve game of every kind and secure it as a valuable food supply for the future use of the people of the State Even the sale of fish propagated in private ponds may lawfully be restricted during the close season In short, the right to take game is a boon or privilege rather than a vested legal right

Modern game laws do not stop with prohibitions against killing game out of season. They

extend to the sale of such game, and even to its possession, during the period of prohibition They have become more stringent and minute in their restrictions The machinery for the enforcement of this provision is far more effective than formerly, and civil suits for heavy fines are more frequently resorted to than criminal prosecutions under indictments

The lack of uniformity of the various State laws dictating the seasons during which birds and animals shall be protected frequently defeats the very purpose for which the laws were framed, and, moreover, makes compliance with the provisions of the Federal law difficult for both shippers and game dealers, who have to consider the open seasons in the State in which the game was killed, and that to which it is their purpose to ship it Still more confusion is caused by the general diversity in defining the seasons In some States the open seasons are given, and in others the closed, while in all their statements is to be found every possible variety of inclusion and exclusion of the dates named In some States the regular killing season is checked by the prohibition of shooting or killing on certain days of the week

Shipment of Game This also is an important subject of game legislation, for one of the greatest factors in the rapid destruction of game in recent years has undoubtedly been the illegal shipment of game from one State to another It has also been an exceedingly difficult problem to cope with, largely because interstate commerce is outside the jurisdiction of the several States There was passed by Congress on May 25, 1900, an act, popularly termed the Lacey Act, which gave to the Secretary of Agriculture all duties and responsibilities connected with the preservation of game and at the same time prohibited interstate commerce in game killed in violation of local laws The Lacey Act is based, to a degree, on State laws, so that its proper enforcement requires a knowledge of certain local provisions which are subject to periodical change Section 4 of this act ordains that every package containing game animals or birds, when shipped by interstate commerce, must be clearly marked, so as to show the name and address of the shipper as well as the nature of the contents In addition to this the laws of Colorado, Connecticut, Louisiana, Michigan, Mississippi, Montana, Nebraska, North Carolina, Ohio, Oregon, Wisconsin, New Brunswick, and Ontario require packages of fish or game to bear a statement clearly indicating the nature of the contents, which must cover the *kind* of game and the *amount* in the package The majority of the States prohibiting exports place no restrictions on shipments within the State, but a few States impose restrictions on the shipment of certain kinds of game, and Kansas prohibits the shipment of all protected game within the State An important event in the development of modern State laws was the establishing by the Supreme Court of the constitutionality of the Connecticut statute prohibiting export of certain game (Geer *v* Connecticut, 11 U S 519) As a result, non-export laws have been adopted throughout all the States, every State prohibiting the export of certain kinds of game In some States the sportsmen may carry a limited amount of game out of the State, but only under special restrictions In most of the States the sale of all or certain kinds of game is prohibited at all seasons, and most States prohibit sale of all game during the close season The most general prohibition among game birds is that against the export of quail, which, with two exceptions, Wyoming and Maryland, is in force in every State of the Union

The Dominion of Canada has a general law, covering and prohibiting the export of wild turkeys, partridge, prairie fowl, quail, woodcock, and deer, except in the case of deer raised on private reserves, and an exception which provides that nonresident sportsmen may export two deer each in a calendar year at certain ports of export within 15 days after the close of the open season

Licenses for Hunting and Shipping Game. In Arkansas nonresidents are denied the privilege of hunting Throughout Canada and in 36 States of the Union nonresidents must secure licenses before it is lawful for them to hunt certain kinds of game In 16 States and four Canadian Provinces a similar restriction is imposed on residents, but the fee is usually nominal, and in all cases considerably less than that imposed on nonresidents

With regard to *fishing*, both for food and game fishes, all that has been said on the subject of hunting also applies Most of the States have their own laws regulating the fishing for food and game fish—the open seasons varying according to the State and the species of fish In some States it is illegal to take fish under a certain size or weight, while in most it is forbidden to take trout, bass, and other fish by netting or spearing, or by any method other than with hook and line The laws apply to fishing in private waters as well as in those that belong to the State

Trespassing. The same laws govern trespass in fishing as in hunting, although some States have made special laws on the subject As a rule, however, the general law throughout the States on this subject decides that if the bottom of a lake or stream is subject to private ownership, the owner has the sole right of fishing, even though the water is deep enough to float a boat and is subject to public use as a highway In public waters the right belongs to the State, and consequently is usually free to the public, although there are instances when the State grants it to particular persons

Consult the Game Laws of the United States and of the separate States See FERÆ NATURÆ, FISHING LAWS

GAMELYN, găm′e-lĭn The hero of an English verse tale of the same name written in the fourteenth century It was formerly ascribed to Chaucer, for the reason that all extant copies of the poem are found in the manuscripts of the *Canterbury Tales* It is interesting as furnishing Thomas Lodge with an outline for the first part of *Rosalind*, upon which Shakespeare afterward based *As You Like It* Consult the appendix to the *Variorum* edition of Shakespeare's play by Furness (3d ed, Philadelphia, 1908), and *The Tale of Gamelyn*, ed by W W. Skeat (Oxford, 1894)

GAME OF CHESS, A A political comedy by Thomas Middleton, satirizing Spain and Roman Catholicism, produced at the Globe Theatre in August, 1624, and published in quarto the same year It was suggested by the notorious Spanish Match and drew much of its abundant detail from contemporary tracts which dealt with that fiasco The Spanish Minister immediately protested to King James concerning it, and

the author was temporarily imprisoned The vogue which the play enjoyed at the time was remarkable, its nine performances netting £1500 Consult Doran, *English Stage* (3 vols, Edinburgh, 1887)

GAME PRESERVE. A park stocked with game, or a tract of country, sometimes enclosed, and set apart for the protection of game At the beginning of the Middle Ages the rulers of Europe maintained their own hunting grounds or forests, a practice which was soon followed by the landed nobility, and out of which grew the present system, by which the right of hunting and the ownership of game is vested in the ownership of the land (See GAME LAWS) Austria-Hungary and Germany contain many hunting estates, as also did France before the Revolution Under such conditions, however, the preservation of game is essentially a private undertaking In the British Isles game preserving has attained a high degree of development, but, as on continental Europe, this is due to the individual landowner rather than to the government, and the impelling motive is a selfish rather than a public-spirited one Scotland possesses the largest single areas set apart for shooting and hunting in the United Kingdom, and the preserve of the Duke of Sutherland ranks as one of the largest in the world The setting apart of vast tracts of arable or grazing land for these purposes has become a very real grievance with the Scottish people

African Preserves. The greatest game preserves are those which have been established in Africa by the British Government Only the most important of these can be mentioned here In British East Africa are the great Athi Plains Preserve, between the Uganda Railway and the northeastern boundary of German East Africa, roughly pear-shaped, about 200 miles long, northwest by southeast, by about 40 miles wide, and the Jubaland Preserve, which lies about 50 miles north of Mount Kenia, which is roughly rectangular, and about 170 miles long, northeast by southwest, by about 130 miles wide Here also are seven other smaller reservations for the protection of certain mammals, such as the rhinoceros, the hippopotamus, the eland, and the roan antelope Another great preserve—with undefined boundaries—lies in the Egyptian Sudan, between the Nile, the Blue Nile, and Abyssinia It is about 215 miles long north and south by about 125 miles wide In the Transvaal are the Sabi-Singwitza Preserve, lying along the northeastern boundary of the colony, about 200 miles long by about 50 miles wide, the Rustenberg Preserve, comprising about 3500 square miles north and south of the headwaters of the Limpopo River, and the smaller Pretoria Preserve Other important African game sanctuaries are as follows in Central Angoniland (British Nyassaland) a preserve—especially for elephants—about 50 miles wide, lying chiefly along the west shore and extending about 200 miles south of Lake Nyassa; in Somaliland, the Hargeis and Mirso reserves, of about 1800 and 300 square miles respectively; in Uganda, the Bondo Reserve, lying along the eastern shore of Lake Albert Nyanza, and the Toro Reserve, situated between that lake and Lake Albert Edward Nyanza

Canadian Preserves. In Canada there are several extensive and many smaller game preserves, most of which were established by the governments of the provinces in which they are situated In Ontario is the great Algonquin National Park, with an area of 1930 square miles, well stocked with moose, caribou, white-tailed deer, black bear, and beaver In Alberta are the following national parks Rocky Mountains, near Banff, 4320 square miles, Yoho and Glacier, 2812 and 2304 square miles respectively, Buffalo, near Wainwright, 600 acres, for American bison, Elk Island, near Fort Saskatchewan, 62 square miles, for bison, elk, and moose, Jasper, on the Athabasca River, near Strathcona, 5450 square miles, and Waterton Lakes, in the southeastern corner of the province, 54 square miles, chiefly for mountain sheep In British Columbia are the Elk River Game Preserve, of about 450 square miles, in the East Kootenai District, the Fraser River Preserve, of about 2250 square miles, between the North and South Forks of the Fraser River, and the Yalakom Preserve, of about 215 square miles, on the north side of the Bridge River, a tributary of the Fraser

In Manitoba are four preserves—the Duck Mountain, of 324 square miles, the Riding Mountain, of 360 square miles, the Spruce Woods, of 64 square miles, and the Turtle Mountain, of 100 square miles—the maintenance of which is exceedingly important to the United States, since within them lie the systems of lakes and marshlands which are among the most important breeding places for North American waterfowl The Province of Quebec has two very large preserves—the Laurentides National Park, of 3565 square miles, in the region bounded by Lake St John, the Saguenay, the St Lawrence, and the St Maurice rivers, and the Gaspesian Forest, Fish and Game Preserve, of 2500 square miles, in the eastern part of the province

United States Preserves In 1914 there were ten national parks in the United States which served as game refuges, as follows Yellowstone, Wyo (established, 1872), 2,142,720 acres, National Zoological Park, D C (1889), 167 acres, Rock Creek, D C (1890), 1606 acres, Sequoia, Cal (1890), 161,597 acres Yosemite, Cal (1890), 719,622 acres, General Grant, Cal (1890), 2536 acres, Mount Rainier, Wash (1899), 207,360 acres, Crater Lake, Oreg (1902), 159,360 acres, Wind Cave, S D (1903), 10,522 acres, and Glacier, Mont, 915,000 acres, total 4,320,490 acres, or about 6,719 square miles Most of these parks shelter more or less big game, the presence of which adds greatly to their educational value Yellowstone Park has much the largest faunal population, which included in 1914 about 500 antelope, 210 mountain sheep, 50 wild buffalo, 162 buffalo in the fenced herd, 33,000 elk—the largest herd on the continent—and many bear, deer, moose, and beaver

In addition to the national parks just mentioned, there were in the United States in 1914 nine national game preserves and other refuges for wild life, as follows· the Wichita, (Okla) Game Preserve, chiefly for American bison and elk (1905), 57,120 acres, Grand Canyon (Ariz) Game Preserve (1906), 1,402,928 acres, the Muir Woods (Cal) National Monument (1908), 295 acres, the Montana National Bison Range (1908), 18,521 acres, the Mobrara (Neb) Reservation, about 1200 acres; Mount Olympus (Wash) National Monument (1909), 608,640 acres; Billy Meadows Pasture, Oreg., 2560 acres, Munkunyuweap (Utah) National

Monument (1909), 15,840 acres, and the Colorado National Monument (1911), 13,883 acres

The national bird reservations in the United States are altogether too numerous to mention in this connection They numbered more than 65 in 1914, and are established by executive order, chiefly for the purpose of protecting large breeding colonies of water birds (many of them game species), or of affording refuges for migratory species in their northward or southward flights, or in winter Generally they are small, rocky islands or tracts of marshland, or areas adjoining reclamation projects in the West Some, however are of considerable extent, as, e g, the Yukon Delta Reservation, and the Hawaiian Islands Reservation Besides the reservations just referred to, there are a few refuges for aquatic mammals and birds, and for fish, some of which are maintained in connection with lighthouse or naval stations The largest of these are the Afognak Forest and Fish Culture Reserve, of 800 square miles, north of Kodiak Island, Alaska, and the Aleutian Island Reservation, Alaska (also a bird reservation)

Several States have set aside considerable tracts of woodland for the preservation of game The most considerable of these reserves is the famous Adirondack State Park, New York. It includes about 2030 square miles of splendid forest land, with scores of beautiful lakes and streams, and many fine mountain peaks which command superb views Many of the lakes and streams are kept stocked with trout and bass by the State, and there is still good deer hunting in much of the forest The park was established in 1892, and is maintained and policed under the direction of the State Conservation Commission Pennsylvania has adopted the policy of establishing game preserves within state forest reserves, and five of these reservations (of about 3200 acres each) had been set aside in 1913 In 1911 Montana established the important Snow Creek Game Preserve, of 96 square miles, in Dawson County, while Wyoming has five large refuges, including the Teton State Preserve (1905), of about 900 square miles, adjoining Yellowstone Park, and the Big Horn Game Preserve (1909) in the mountain range of that name

There are in the United States a very large number of game preserves which are owned by individuals or associations Probably the first extensive undertaking of this kind was the preserve of about 200 acres established about 1859, near Ottawa, Ill, by John Dean Caton, author of *The Deer and Antelope of America* An important preserve is that which was founded in 1885 near Newport, N H, by Austin Corbin This is still maintained by Mr Corbin's son and others It is known as the Blue Mountain Forest Park, contains a large herd of bison (from which have been recruited several other herds), and includes about 27,000 acres of fine forest land In the Adirondacks there are many large private preserves, some of which are maintained under conditions which have caused much resentment among the natives and have resulted in two homicides On St Vincent Island, near Apalachicola, Fla., Dr Ray V Pierce established a preserve of about twenty square miles in 1909, and here much effective work has been done in the protection of waterfowl In 1912 Mrs Russell Sage (q v.) bought Marsh Island, off the coast of Louisiana, as a refuge especially for waterfowl, and this, with the neighboring Louisiana State Game Preserve of 13,000 acres, near Marsh Island, and the Ward-McIlhenny Wild Fowl Preserve of about 11,000 acres adjoining, constitutes one of the most important bird refuges on the southern coast In 1914 George Vanderbilt offered to the United States Government the major part of his great estate, Biltmore, N C, and the offer was accepted

For an interesting account of the great game preserves in Africa and on this continent, consult Hornaday, *Our Vanishing Wild Life* (New York, 1913) Stevenson-Hamilton's *Animal Life in Africa* (London, 1912) contains maps which show with some precision the location of the African preserves For readable descriptions of these latter regions, consult Dugmore, *Camera Adventures in African Wilds* (New York, 1910), and Roosevelt, *African Game Trails* (ib, 1910) The various reservations in the United States are enumerated and described by Dr T S Palmer, in *National Reservations for the Protection of Wild Life, Circular No 87*, issued by the United States Department of Agriculture, Bureau of Biological Survey (Washington, 1912) See FISHING, HUNTING, WILD LIFE, CONSERVATION OF.

GAMES, ANCIENT The public games of Greece and Rome were athletic contests and spectacles of various kinds, generally connected with religious observances It is hard to overestimate the influence of the public contests of Greece in developing the extraordinary appreciation of physical beauty among the Greeks, and its reflection in art and literature They also exercised a powerful influence in promoting a feeling of national unity in opposition to the many rivalries which tended to disrupt the Grecian world As the contests came to take on more and more of the professional character, the admiration for the athletes decreased, and the games lost much of their early character In the Homeric poems we find games a part of the funeral of a great chief, but with the fall of the nobility they become associated with some special sanctuary or religious festival. The Romans called their public games *ludi* The *ludi* were performed first in payment of vows, usually in connection with war, later they became annual celebrations They were under the care of state magistrates, usually the ædiles, less often the prætor A sum of money was granted for the *ludi* by the state, but to this ever-increasing amounts were added by the magistrates themselves The *ludi* were known as *ludi amphitheatrales, ludi circenses,* or *ludi theatrales,* according to the kind of spectacle that formed the chief attraction Some of the *ludi* lasted 16 days The Romans preferred to play the part of spectators, and their shows were often gladiatorial and bloody—things entirely foreign to the feeling of free Greece Consult Becq de Fouquières, *Les jeux des anciens* (Paris, 1869), and E N. Gardiner, *Greek Athletic Sports and Festivals* (London, 1910) See ATHLETICS, GREEK FESTIVALS, ROMAN FESTIVALS, OLYMPIC GAMES, PYTHIAN GAMES, NEMEA; ISTHMUS, PANATHENÆA, CIRCUS, AMPHITHEATRE, GLADIATOR, LAMPADEPHORIA, MEGALESIA, NAUMACHIA, PENTATHLON, SECULAR GAMES, THEATRE For the *ludi Apollinares,* see APOLLO. For private games, see such titles as COTTABUS, GAMBLING

GAMES, SECULAR. See SECULAR GAMES

GAME'STER, THE. 1. A comedy by Shirley

(1633) It is founded on a novel by Celio Malespini, and in its turn suggested Johnson's *The Wife's Relief* (1711), Garrick's *The Gamesters* (1758), and Poole's *The Wife's Stratagem* (1827) Charles I approved it highly, and is said to have even assisted in the construction of its plot 2 A comedy by Mrs Centlivre (1705) It was taken from Regnard's *Le joueur* (1696), and suggested Destouche's *Le Dissipateur* (1736) 3 A bourgeois tragedy in prose by Edward Moore, produced with success at Drury Lane, Feb. 7, 1753. Garrick wrote the scene between Lewson and Stukely in the fourth act, and played the principal part

GAM'ETAN'GIUM (Neo-Lat, from Gk γαμέτη, *gametē*, wife + ἀγγεῖον, *angeion*, vessel) The organ of plants in which the sexual cells (gametes) are developed In its narrow sense, the name is used only in connection with the lower algæ and fungi, in which the gametes are alike in appearance In the higher plants the gametes are very dissimilar (eggs and sperms), and the organs which produce eggs are called oogonia or archegonia, and those which produce sperms antheridia

GAMETE, ga-mēt' *or* găm'ĕt (Gk. γαμέτη, *gametē*, wife, from γάμος, *gamos*, marriage, from γαμεῖν, *gamein*, to marry). The sexual cell which fuses with another in the process of fertilization In the lowest plants gametes are similar in appearance, and there is no apparent distinction of sex In most plants, however, the pairing gametes are strikingly different One of them is a small and usually ciliated body called the sperm, while the other is a comparatively large and passive body called the egg In every case the gamete is a naked cell The organ in which the gametes are formed is called a gametangium; and when the gametes are differentiated, the gametangium which produces the sperms is called an antheridium, while that which produces the egg is called the oogonium in the algæ and fungi (thallophytes) and archegonium in the higher groups See FERTILIZATION.

GAM'ETOPHYTE (from Gk γαμέτη, *gametē*, wife + φυτόν, *phyton*, plant). That phase in alternation of generations of plants which bears the sex organs For example, in mosses the ordinary leafy moss plant is the gametophyte, while in ferns the prothallium is the gametophyte The alternating asexual phase is called the sporophyte. See ALTERNATION OF GENERATIONS, PROTHALLIUM

GAME'WELL, FRANCIS DUNLAP (1857–). An American Methodist missionary, born at Camden, S C He studied civil engineering at Rensselaer Polytechnic Institute and at Cornell University, and graduated from Dickinson College in 1881 He was engaged in educational work at Peking, China, in 1881–84, superintended the West China Mission in 1884–87, and was professor of chemistry at Peking University from 1889 to 1900 In 1900 he was chief of staff of the Europeans and Americans who defended themselves in the British Legation at the time of the siege of Peking during the Boxer uprising From 1901 to 1908 he served as field secretary and executive secretary of the Board of Foreign Missions of the Methodist Episcopal church, was superintendent of education for China for the Methodist Episcopal church in 1909–12, and in 1912 became general secretary of the Educational Association of China He also became editor of the *Educational Review.*

GAM'GEE, ARTHUR (1841–1909) An English physiologist, born in Florence, Italy, educated at Edinburgh University, and was there assistant in medical jurisprudence from 1863 to 1869, in 1873 was appointed the first Brackenbury professor of physiology in Owens College, Manchester He was also professor of physiology at the Royal Institution of Great Britain from 1882 to 1885, and in 1887 became lecturer on materia medica in St George's Hospital, London After his retirement from Owens College as professor emeritus, he practiced medicine and conducted private investigations He became known for his researches in physiology and physiological chemistry In 1903–05 he pursued studies in the physiology of nutrition for the Carnegie Institution at Washington His writings include a translation and edition of Hermann's *Grundriss der Physiologie* (Berlin, 1863), and a *Text-Book of the Physiological Chemistry of the Animal Body* (1880–93)

GAMICZER, WENZEL. See JAMNITZER

GAMING. See GAMBLING

GAM'MA RAYS Radiations from radium and other radioactive substances They cannot be deviated by an electric or magnetic field, and are considered to be a "hard" type of Roentgen rays (q v)

GAM'MER GUR'TON'S NEEDLE The title of an English comedy, performed at Cambridge in 1566, and printed in 1575 It has been ascribed on insufficient grounds to John Still (?1543–1607), Bishop of Bath and Wells In order of time it is the second of the English comedies founded on Latin models, the first being *Ralph Roister Doister*, by Nicholas Udall, printed in 1566. The theme of the play is the loss of a needle by Gammer Gurton, a village housewife, while she is mending her husband's breeches, and the consequent disturbance in the household and the village The wit is coarse, homely, and boisterous The play contains the oldest and one of the most famous drinking songs in the English language—"Back and side go bare, go bare" Consult Dodsley, *Old Plays*, ed by W C Hazlitt, vol iii (London, 1874–76)

GAM'OPET'ALÆ Another name for the Sympetalæ, one of the divisions of the dicotyledons (q v)

GAMP, MRS SAIREY A professional nurse in Dickens's *Martin Chuzzlewit*, husky, tearful, and given to stimulants during her night watching She constantly refers to her mythical friend Mrs Harris in confirmation of her own views, and is noted for her plethoric umbrella, which has given the name "gamp" to others of similar shape

GAMTOOS (gam'tōs) **RIVER** A river of Cape of Good Hope, South Africa, which rises in the plateau of the Great Karoo in a number of wady-like streams. At the east end of the Zwarte Berge it becomes a permanent watercourse, flowing southeasterly to the Indian Ocean, which it enters through St Francis Bay about 50 miles (coastwise) west of Port Elizabeth A number of tributaries are received by the main stream from both the east and the west, the Konga River from the latter being the chief one

GAM'UT The name given to a system of musical notation invented by Guido Arezzo (q v), a Benedictine monk of the tenth century He called the lowest tone of the musical system gamma (Greek letter *g*), and then, taking the syllables from an old Latin hymn, called the notes of the hexachord ut, re, mi, fa, sol, la.

The scale thus formed, with the later addition of si for the seventh, acquired the name *gamut* (gamma-ut), or French *gamme*

GANANCIAL (ga-năn'shal) **SYSTEM** (from Sp *ganancia*, gain, profit). The Spanish law governing the title and disposition of property acquired by husband and wife during the existence of the marriage relation It is almost identical with the community system of the French law and many of our Western States, the chief point of difference being that under the Spanish rule the conjugal community of ownership cannot be renounced or modified by any stipulation or agreement of the parties except in case of a judicial separation, whereas under the other system they are permitted to regulate the ownership of their separate or jointly acquired property by contract.

Several of the States acquired by the United States from Spain have retained this system without material modification, and it exists in most of the Spanish-American countries In Spain it is regulated by the Civil Code The term is not generally employed in the United States. See COMMUNITY OF PROPERTY, HUSBAND AND WIFE

GAND, gan See GHENT

GANDA, BAGANDA, ba-gán'dá. Names applied to the Uganda Protectorate and the native population

GANDAK, gŭn'dŭk', or **SALIGRAMI,** sa'lē-gra'mē A snow-fed river of the Northwestern Provinces and Behar, India, a northern tributary of the Ganges It rises in the Nepal Himalayas and joins the Ganges opposite Patna, after a southeasterly course of about 400 miles Only a small portion of its course is navigable below Bhelunji, but rafts of timber are floated down from Nepal It drains an area of about 40,000 square miles

GANDAMAK, or **GUNDAMUK,** gŭn'da-mŭk' A village in the eastern part of Afghanistan, 28 miles west of Jelalabad On the fatal retreat from Kabul in 1842 a body of about 100 British soldiers and 300 camp followers were massacred here Only one man escaped In 1879 a treaty was concluded at Gandamak between the British and Yakub Khan

GANDARA, gán'dá-ra A town of Samar, Philippines, situated on the left bank of the Bac-hao Bangahón, 17 miles north of Catbalogan In 1900 it was nearly destroyed during a battle with insurgents Pop, 1903, 12,014

GANDHI, MOHANDAS KARAMCHAND (1869–) Indian nationalist, born at Porbandar, India, and went to London to study law in 1888 After careful study and observation of Christianity and Western civilization, he returned to India in 1893, but soon went to South Africa to practice law He was brutally mistreated by the white men in South Africa, but he bore his burden by developing a philosophy of passive resistance Before and during the Great War he had been a strong supporter of the British Empire, but after it was over he became the nationalist leader He was sentenced to imprisonment in 1922 For his policy of civil disobedience, etc, see INDIA, HISTORY

GANDÍA, gan-dē'á A town in the Province of Valencia, Spain, 47 miles by rail south-southeast of the city of Valencia, on the Río Séripis, or Alcoy, about 2 miles from the sea (Map Spain, E 3). The river valley is here very rich and fertile Gandía's ancient walls are still standing, it has a hospital, a modern Jesuit convent, a town hall, the palace of the dukes of Osuna, the Colegio de Escuela Pia, founded by St Francis of Borgia, who was born in Gandía, and the collegiate church, a Gothic structure with fine paintings and sculptures There are plazas and promenades The town is situated in an extremely fertile valley which produces grain, rice, oranges, raisins, wine, oil, and silk Through the port at the mouth of the river Gandía carries on a considerable coastwise and foreign trade, its principal industrial establishments include silk mills, ribbon and velvet manufactories, and tanneries Flour, timber, guano, and coal are the principal articles of trade Pop, 1900, 9924, 1910, 11,659 Consult A F Calvert, *Valencia and Murcia* (New York, 1911).

GANDIER, gaN'dēr', ALFRED (1861–) A Canadian clergyman and educator He was born in Hastings Co, Ontario, and was educated at Queen's University, Kingston, where he graduated with high honors in 1884 His theological studies were pursued at Edinburgh University Ordained to the Presbyterian ministry in 1889, he filled pastorates at Brampton, Ontario (1889–93), Halifax, Nova Scotia (Fort Massey Church, 1893–1901), and Toronto (St James's Square, 1901–08) He was lecturer on apologetics at Knox College in 1902–08 and in 1908 became principal of that institution

GANDO, gan'dō, or **GANDU,** gan'dōō A former subordinate sultanate of the Sokoto Empire, now merged (since a treaty between France and England in 1898) in the colonies of Nigeria and in Dahomey and Upper Senegal and Niger, reaching along both sides of the Niger from Gomba up to Birni (Map Africa, E 3) Sokoto is on the east, the region of the Mossi on the west, and the District of Ilorin on the south Gando is embraced among the Hausa states, being inhabited by the Hausas, Fulbes, and Suihais The Sultanate of Gando was founded in 1817, and titular sovereigns still remain, the last Emir being appointed by the British in 1903, he has, however, little or no authority, as most of Gando is governed as an integral part of Nigeria Total population of the sultanate, about 5,500,000 The former capital, Gando, is situated halfway between Sokoto and Gomba, with a population of about 12,000

GANDOLFO, gán-dōl'fō See CASTEL-GANDOLFO

GAN'DON, JAMES (1743–1823). An English architect, born in London, of Huguenot descent He began the study of drawing as a boy, became a pupil of Sir William Chambers, and was the first to receive a gold medal for architecture from the Royal Academy (1769) Two years later he went to Ireland and followed his profession there until his death, with a break of two years spent in London Some of the most prominent buildings in Dublin were planned by him, such as the House of Commons (1786), the customhouse (1791), Carlisle Bridge (1791–94), and the Four Courts (1802).

GANDU, gán'dōō See GANDO.

GANELON, ga'ne-lon One of Charlemagne's paladins, who plays an important part in the Carolingian cycle of romance It is said that his castle was built on the Blocksberg, the loftiest peak of the Harz Mountains Ganelon was jealous of Roland, and in order to destroy his rival he treacherously planned with Marsillus, the Moorish King, the attack of Roncesvalles. He is represented as a man of more than ordinary

build, fierce in his demeanor, and a lover of solitude. His name became a synonym of treason He is mentioned in Chaucer's *Nun's Priest's Tale* and in Dante's *Inferno*

GANESA, ga-nā'sha, or **GANESH,** ga-nĕsh' (Skt, lord of the host, from *gana,* host + *īśa,* lord) One of the most popular Hindu minor divinities, the god of wisdom and remover of obstacles His temples, shrines, or images are to be seen even in the smallest villages in India, and his grotesque figure, with an elephant's head, four arms, and a huge protruding belly, usually painted red, is not only familiar by the wayside, but is employed as a sign over the doors of shops, to bring luck in business As a remover of difficulties, he is invoked at the beginning of Sanskrit literary works, with the formula *Namō Ganeśāya* (Homage to Ganesa), and he is likewise prayed to for success in all sorts of enterprises and undertakings In Hindu mythology Ganesa is the son of Siva and Parvati (q v), or of Siva alone, and various legendary accounts are given to explain the presence of his elephantine head with its single tusk His name, which is found also in the form *Gana-pati,* means lord or leader of the company of minor divinities that attend upon Siva He is often represented as riding upon a rat, a creature symbolic of the god's familiarity with out-of-the-way places and dark or obscure matters Consult Wilson, *Hindu Mythology* (London, 1900), Dowson, *Classical Dictionary of Hindu Mythology and Religion* (5th ed, ib, 1913), Bandharkar, *Vaisnavism, Saivism* (Strassburg, 1913) See Plate of HINDU DEITIES in article INDIA

GAN'GA (Catalan, grouse) A local name for three birds (1) any sand grouse, especially the pin-tailed species (*Pterocletes alchata*) common in southwestern Asia and in winter in northern India; (2) a South American carrion hawk, or caracara, of the genus *Ibycter,* (3) the helmeted cockatoo (*Callocephalon galeatum*) of southeastern Australia and Tasmania—it is prevailingly gray, with a head and crest of flaming red and the feet nearly black

GAN'GA SAGOR' See SAUGOR.

GANGES, găn'jēz (Skt *Gangâ,* stream) An important river of north India, rising in Garhwal, in lat. 30° 56′ 4″ N and long 76° 6′ 40″ E It drains the southern ranges of the Himalayas and after a southern and eastern course of 1557 miles flows into the northern section of the Bay of Bengal through a multi-channeled delta 283 miles long (Map India, D 3). Its basin, lying between the Himalaya and Vindhya ranges, one of the finest and most fertile portions of the world, covers an area of over 390,000 square miles, and this basin is one of the densest populated areas of the globe The Ganges has its main source in a snow field embedded between three Himalayan mountains over 22,000 feet high It issues as the Bhagirathi from an ice cave, 10,300 feet above sea level, and with a fall of 350 feet in a mile descends 10 miles to Gangotri, the first temple upon its banks, and a favorite pilgrim resort Seven miles below Gangotri it is joined from the right by the Jahnavi, and at Deoprayag (q v), 133 miles from its source, the Bhagirathi joins the Alaknanda, the united streams being from this point called the Ganges The Ganges leaves the Himalayas at Sukhi and reaches the border of the great plain of Hindustan at Hardwar, 157 miles from its source and 1024 feet above the sea, after a descent of 9276 feet, or nearly 60 feet in a mile From Hardwar it flows past Atrauli and Farukhabad, near which it receives the Ramganga, and continues past Kanauj and Cawnpore to Allahabad after a winding course of 488 miles, beset by shoals and rapids, and with an average fall of 22 inches per mile The stream is navigable for river craft to Hardwar, for small-draft steamers to within 100 miles of the mountains, and for loaded barges to Cawnpore, 140 miles northwest of Allahabad At Allahabad the Ganges is joined by the Jumna from the southwest, and thence the increasing river flows east to Mirzapur, Benares, Ghazipur, Patna, Monghyr, and Bhagalpur, receiving from the right the Son and from the left the Gumti, Gioga, Gandak, and Kusi This section, which has a fall of about 5 inches a mile, varies in breadth and in depth according to the season of the year, but, notwithstanding many shoals, is navigable even in the dry season for vessels drawing 18 inches of water Around the Rajmahal Hills, at the head of its delta, 563 miles from Allahabad, the Ganges bends southward and commences a descent of 283 miles to the Bay of Bengal Near Pakaur (assuming the early name of the river) the Bhagirathi, and 70 miles lower down the Jalangi, branch off and, after individual courses of 120 miles each, unite to form the Hugli, the westernmost and principal channel of navigation, on which Calcutta (q v) stands The main branch, throwing out various minor offsets, continues as the Padna, or Padda, to Goalundo, where it unites with the Jamuna, the main branch of the Brahmaputra, and finally flows through the wide estuary of the Megna into the Bay of Bengal, between this estuary and the west channel of the Hugli lie the numerous mouths of the deltaic channels The delta, which in the northern part is fertile and well cultivated, in the south bordering the sea is a dismal network of swamp land, known as the Sundarbans (q v), infested by crocodiles, tigers, and other wild animals Three distinct species of crocodiles are found in the Ganges—the fresh-water long-snouted gavial, the man-eating koomiah, and the muggar

The Ganges, as a whole, cannot be accurately described From year to year it exchanges old channels for new ones, more particularly in the alluvial basin of its lower sections Even as high as Fathipur, above Allahabad, this characteristic is marked In this part the river bed has an average width of 4 miles, within the limits of which it changes its course annually, in the lapse of four or five years shifting from the one limit to the other Between seasons the fluctuations in some places are more conspicuous, at Benares the stream ranges, according to the time of the year, from 1400 feet to 3000 feet in breadth and from 35 feet to 78 feet in depth. Lower down these vicissitudes produce more striking results. Towards the end of July a proportion of the delta is inundated over an area of more than 100 miles in diameter, presenting to the eye nothing but villages and trees and craft of every sort To mitigate this evil, expensive dams have been constructed with a collective length of over 1000 miles The influence of the tides extends, at the dry season, a distance of 240 miles from the sea The minimum outflow of water per second has been estimated at 36,000 cubic feet, and its maximum at 494,000 cubic feet Like all rivers subject to floods, the Ganges holds in suspension a large admixture

of mud and sand, depositing in the sea annually millions of tons of solid matter

The Ganges—or, as it is called, the Gangā (feminine)—occupies an important position in Hindu mythology of the classical and the Purānic periods and is the subject of numerous traditions and legends In the religion of all classes of Hindus it is held in particular veneration as the holiest of rivers, the cleanser of sins, and the entrance to Paradise, when death and sepulture occur upon its banks Temples and shrines with ghats or flights of steps, giving easy access to its waters, stud its banks almost from its source, the most conspicuous examples are the temples and ghats of holy Benares The most famous cities of India have developed at critical points on the banks of the Ganges, as, e g, the confluence of a tributary, and these have become sanctified spots, that of the Jumna at Allahabad is considered the most sacred and is the most frequented place of ablution, annually visited by thousands of pious pilgrims, who also convey the water to all parts of India for use in their religious rites

GANGES CANAL, Upper and Lower A navigable channel of India, which obviates the difficulties in the navigation of the Ganges above Allahabad, and with numerous branches irrigates the Doab, or country lying between this river and the Jumna The Upper Canal, commenced in 1848 and opened in 1854, extends on the right bank of the Ganges from Hardwar to Cawnpore and Etawah and irrigates an area of 978,000 acres The Lower Canal, opened in 1878, continues to Allahabad The total length of the main channel is 700 miles, and its irrigating branches amount to nearly 3000 miles, covering 830,000 acres A magnificent aqueduct of 15 arches which crosses the Solani, and the weir wall at Narora, 3800 feet long, with 42 sluices, are monumental works upon its course. The entire work cost about $25,000,000 Consult P T Cantley, *The Ganges Canal* (London, 1864) See Canal

GANGHOFER, gang'hō-fēr, Ludwig (1855–1920) A German novelist and playwright, the son of August Ganghofer, a celebrated Bavarian forester He was born at Kaufbeuren and studied at the universities of Wurzburg, Munich, Berlin, and Leipzig In 1879 he published his first book, a volume of poetry entitled *Von Stamme Asra.* In 1880 his first play (in collaboration with Hans Neuert), *Der Herrgottschnitzer von Ammergau* (10th ed, 1904), achieved success at Munich Two other dramatic successes, *Wege des Herzens* and *Der Anfang vom Ende* (1881), were followed by his appointment as dramatic author to the Ringtheater at Vienna, for which he wrote a number of comedies, mostly imitations of Anzengruber (q v) From 1886 to 1892 he was one of the editors of the Vienna *Tageblatt* Besides his plays and some volumes of verse, he published the following stories and novels, rather better than his plays *Der Jager von Fall* (1882, dramatized as *Der Zweite Schatz*), *Bergluft* (1883), *Aus Heimat und Fremde* (1884), *Die Sunden der Vater* (1886), *Edelweisskonig* (1886); *Oberland* (1887), *Der Unfried* (1888), *Der Besondere* (1890), *Die Fackeljungfrau* (1901), *Der Klosterjager* (1892), *Die Martinsklause* (1894), *Der laufende Berg* (1897); *Das Gotteslehen* (1899), *Das Schweigen im Walde* (1899), *Der Dorfapostel* (1900), *Das neue Wesen* (1902), *Der hohe Schein* (1905), *Gewitter im Mai* (1905), also the plays *Der heilige Rat* (1912), *Die letzten Dinge* (1912), *Der Wille zum Leben* (1913)

GANGI, gan'jē A city in the Province of Palermo, Sicily, 2800 feet above sea level, on the slope of a steep mountain, 65 miles southeast of Palermo (Map Italy, E 6) A great ancient fortress towers above it Near by is the convent of San Benedetto, built on the ruins of the old town that was destroyed in 1299 by Frederick II Some scholars have identified Gangi with ancient Enguion or Engyon, Engurium, whose celebrated temple of the Great Mother was, according to Cicero, despoiled by Verres (q v) There is no real evidence, however, for the identification Pop (commune), 1901, 11,376, 1911, 10,393

GANGLION, găn'glĭ-on (Lat, from Gk γάγγλιον, tumor) In surgery, a term applied to small, tense, rounded swellings containing fluid that develop in the course of tendon sheaths and are most often situated on the dorsum of the hand and wrist In anatomy, small masses of nerve tissue, by which communication is established between various nerve trunks See Nervous System

GANGOTRI, gan-gō'trē (Hind, Descent of the Ganges) A temple erected on the highest accessible spot on the Ganges (q v), about 10,000 feet above sea level, on the right bank of the river (here called the Bhagirathi), some 10 miles from its source. Immediately in front the stream expands into a small bay, which is subdivided into pools, taking their names respectively from Brahma, Vishnu, and other gods Though the water is specially sacred, and ablution peculiarly efficacious, yet, from various causes, the pilgrims are by no means numerous Besides the length and ruggedness of the journey, and the difficulty of procuring subsistence by the way, there is no accommodation for visitors, the only dwelling house in the locality being occupied by the officiating Brahmans However, flasks of the holy element, sealed by the attendant priests, are exported

GANGRA, gan'gra, Council of A council held at Gangra, in Paphlagonia, dated variously from 320 to 370 A D, against Eustathius of Sebaste, who was the first preacher of the ascetic life in the countries around Pontus, where his disciples became numerous He taught that it is unlawful to marry and to eat certain meats, separated several married persons, and advised those who disliked the public offices of the Church to communicate at home He wore, and imposed on his disciples, a distinctive dress, compelled women to cut off their hair, and directed his followers to shun, as profanation, the communion and benediction of a married priest In opposition to these and similar views the council published 20 canons condemning those who pronounced marriage unlawful, who forbade the eating of meat, refused to receive the communion at the hands of a married priest, wore a peculiar dress as a mark of unusual strictness, forsook their husbands through a false horror of marriage, and deserted their children or their parents under pretext of leading an ascetic life Consult Hefele, *History of the Councils* (Eng translations by Clark, Oxenham, and Buch, Edinburgh, 1876–96)

GANGRENE, găn'grēn (OF *gangrene,* from Lat *gangræna,* from Gk γάγγραινα, *gangraina,* eating sore, from γραίνειν, *graineiv,* to devour, Skt *gar,* to swallow). The loss of vitality in a

part of the living body, whether external or internal, the part becoming often, in the first instance, more or less red, hot, and painful, then livid, and finally dark and discolored, black, or olive green, according to circumstances, and later putrescent, after which a separation takes place gradually between the living and dead parts, and if the patient survive, the disorganized tissue sloughs off, and the part heals by the formation of a cicatrix (See CICATRIZATION) Gangrene is classified into two main varieties, *moist* and *dry*, according to the condition found in the part Examples of moist gangrene are inflammatory and traumatic gangrene, hospital gangrene cancrum oris or noma (q v), bedsores, carbuncles, and diabetic gangrene Varieties of dry gangrene are Raynaud's disease, senile gangrene, severe frostbite, and that arising from ligation of large arteries and from embolism The first variety is usually characterized by rapid, the second by slow, development Gangrene may be brought about by local agencies, such as pressure, extreme heat or cold, chemicals, or disease or injury of the blood vessels, or it may be due to constitutional disturbances such as accompany certain mental and nervous affections, cardiac disease, fevers, exhausting diseases, nephritis, and diabetes mellitus, or follow the administration of certain drugs, as ergot The treatment requires that the strength of the patient be maintained by a nourishing and stimulating diet, to counteract constitutional causes, and that amputation be done or natural separation favored by the surgeon, according to his judgment In gangrene from frostbite or in senile gangrene, to await natural separation is the rule.

GANGS, AGRICULTURAL. A name applied to groups of women, girls, and boys brought together for labor in the fen districts of England, or the low tracts south of the Wash in the counties of Lincoln, Cambridge, Norfolk, Suffolk, and Rutland. Not long ago this part of the country was a marsh, but since dikes and canals have been constructed to drain it, it has become one of the most fertile districts of England Instead of erecting houses on this land to be used as homes by farming tenants, the landlords escaped the exactions of the poor laws by employing laborers from the villages on the highlands near by As women, girls, and boys worked more cheaply than men, they were exclusively employed Near the close of the session of 1866–67 an Act was passed regulating agricultural gangs. It provided that no woman or child should be employed in the same gang with men or boys, and that no woman or girl was to be employed under a male gangmaster, unless a woman licensed to act as superintendent was also present with the gang The effect of this act was most salutary A commission was appointed in 1867 to inquire into the employment of women and children in agriculture, to investigate how far the principles of the factory acts could be applied to agriculture, with the special view of securing the better education of the children On Aug 5, 1873, was passed the Agricultural Children Bill, which provided that no child should be employed under the age of 8, none between the ages of 8 and 10 who had not a certificate showing 250 days' attendance at school the previous year, and none between the ages of 10 and 13 who could not produce a certificate showing 150 days' attendance

GANGUE, gäng (Fr, from Ger *Gang*, vein). A term applied to the useless minerals occurring in ore Quartz is the most common gangue mineral, but calcite, barytes, fluor spar, and other minerals, even of metallic character, are not uncommon Portions of the gangue are sometimes worked and submitted to metallurgic processes, since they may contain enough metallic material to be classed as low-grade ore

GANG'WAY A passageway or thoroughfare in a ship, now generally applied to the opening in the ship's rail leading to the gangway ladder, or gangplank, and to the part of the deck in this vicinity which is forward of the quarter deck In old-type ships the term is applied to the passages or parts of the upper deck between the quarter-deck and forecastle In the days when the quarter-deck was only a partial deck, the gangway was a raised platform connecting it with the forecastle When a ship is not lying at a wharf, the gangway is reached by means of an *accommodation ladder*, which is a portable flight of steps bolted to a gangway platform (sometimes called the *upper grating*) at the upper end and reaching down nearly to the water At the lower end it is supported by an iron span and ropes from above or rests on a lower platform or grating When at sea, the platforms and ladder are unshipped and placed on deck, the side may then be climbed by means of iron brackets or wooden cleats secured to the side of the ship, forming a fixed *sea ladder* Portable sea ladders are made of rope with flat wooden steps about 18 inches long and 3 or 4 inches wide These are hung over the side at any places where they may be needed

GANGWAY, IN GEOLOGY See LEVEL.

GAN-HWUY, gŏn hwōō'ē See NGAN-HWEI

GAN'ISTER A hard, siliceous variety of clay, occurring in different formations Owing to its refractory character, it is used as a lining for furnaces, particularly in iron smelting See FIRE CLAY

GANNAL, ga'nal', JEAN NICOLAS (1791–1852) A French chemist He invented the elastic rollers used in printing and made important improvements in the manufacture of borax and the preparation of tallow He also discovered the method of preserving anatomical preparations and of embalming bodies by means of solutions of aluminium salts, etc He wrote *Histoire des embaumements et de la préparation des pièces d'anatomie normale* (1837)

GANNAT, ga'nä' The capital of an arrondissement in the Department of Allier, France, pleasantly situated on the Andelot, a tributary of the Allier, amid hills covered with vines and timber trees, 34 miles south-southwest of Moulins (Map France, S, H 2) In former times it was fortified by walls and ditches, the ruined castle is utilized as a prison The church of Sainte-Croix presents interesting architectural features of the eleventh to the fourteenth centuries Gannat has mineral springs, breweries, tanneries, manufactures of cutlery, and a trade in corn, wine, and cattle Pop, 1901, 5324, 1911, 4931

GAN'NET (AS *ganot, ganet*, OHG *ganazzo*, MHG *ganze*, gander, connected ultimately with Lat *anser*, Gk χήν, *chēn*, Skt *hansa*, goose) A large gregarious sea bird, closely allied to the pelicans Gannets frequent the coasts of most parts of the world offering rocky cliffs upon which they may breed in fair security, and nine species are known, constituting the genus *Sula*

and family Sulidæ Most of the species inhabit the tropics and the Southern Hemisphere and are called boobies (see BOOBY) by sailors

The typical and best-known member of the family is the gannet of the north Atlantic (*Sula bassana*), which derives its specific name from its frequency on Bass Rock in the English Channel, it is also called solan (i e, Solent) goose for the same reason It is scattered in summer at suitable places all around the British and Scandinavian coasts, about the islands of the north Atlantic, and from southern Greenland down to the Gulf of St Lawrence Nevertheless their colonies are scattered and steadily diminishing This gannet has a body much like that of a goose, but weighs less, its total length is about 3 feet, much of which belongs to the neck and long, strong, conical beak Its general color when adult is white, with the head and neck buff, and the primaries of the long wings black and very conspicuous as they lie crossed above the tail when folded Young specimens are mottled brown until three or four years old In winter the gannets migrate to the northwest coasts and islands of Africa, or to the Gulf of Mexico, but early in the season they go north again, appearing at their breeding haunts in April, where by May they are collected in thousands about the sea-fronting cliffs The gannets of Bass Rock were estimated in 1831 at 20,000, and in 1869 at 12,000, and at present number about 6500 The decrease there and in the Hebrides is due to the excessive gathering of their eggs and downy young The latest estimate of all the gannets in the Northern Hemisphere places the number at 101,000 On the American coast they nest along the shore of Labrador, and at Percé Rock and Bonaventure Island, off the Gaspé peninsula, and on Bird Rock, an outlier of the Magdalen group, in company with murres, kittiwakes, etc , but even in these almost inaccessible places they are growing less in numbers, although somewhat protected Upon the summits and ledges, wherever a square yard of room may be found, a gannet places its shallow nest of seaweed and lays and incubates its single chalky-white egg The sitting females crowded along the ledges make them look sometimes as if covered with snow, while the neighborhood will be full of their mates, roosting, flying about, or darting down into the sea They sail about at a considerable height, their eyes searching the surface for fish, and when one is seen they turn downward, shut the wings, and seem to drop upon it with amazing velocity, rarely missing a capture. They also make long excursions seaward, and towards the close of the breeding season are of service to the fisherman by finding and disclosing to him shoals of herrings and the like, which they follow and prey upon in great numbers For the gannets in the Gulf of St Lawrence, consult the following richly illustrated books Chapman, *Bird Studies with a Camera* (New York, 1900), Job, *Among the Waterfowl* (ib, 1902), and especially the admirable monograph on this bird by J H. Gurney, *The Gannet* (London, 1913)

GAN'NETT, EZRA STILES (1801–71) An American Unitarian clergyman, son of Rev. Caleb Gannett, and grandson of Ezra Stiles, president of Yale College He was born in Cambridge, Mass, and was educated at Harvard In 1824 he became assistant to Channing in the Federal Street Church and in 1842 succeeded him as pastor His incessant toil as the first secretary of the American Unitarian Association, one of the prime movers in the formation of the Benevolent Fraternity of Churches, founder and editor of the *Scriptural Interpreter*, and in many other interests, resulted in his breaking down in 1836, and soon after he was crippled by a paralytic stroke But his mental activity was not abated. He edited the *Monthly Miscellany of Religion and Letters* and the *Christian Examiner*, besides attending alone to his large parish He was an overseer of Harvard College from 1835 to 1858 and received its degree of D D in 1843 He retired from pastoral work in 1869 and was killed in a railroad accident He was a Unitarian of the more conservative type, an excellent preacher, and an ardent reformer Consult the memoir by his son, William Channing Gannett (Boston, 1875)

GANNETT, HENRY (1846–1914) An American geographer He was born in Bath, Me, graduated at Harvard in 1869 and at the Hooper Mining School in 1870, was an assistant in the Harvard College Observatory in 1870–71, in 1872–79 was topographer to the Hayden Survey, and in 1882 became chief geographer of the United States Geological Survey He was geographer for the tenth, eleventh, and twelfth censuses of the United States and assistant director of the census of the Philippines (1902) and of Cuba (1907–08) From 1897 to 1909 he was a vice president of the American Statistical Association, and he became president of the National Geographic Society He contributed much geographical matter to the NEW INTERNATIONAL ENCYCLOPÆDIA His publications include *A Manual of Topographic Methods* (1893), *Dictionary of Altitudes* (3d ed, 1899), *The Building of a Nation* (1895), *Gazetteer of Cuba* (1902), *Gazetteer of Texas* (1902), *Origin of Certain Place Names in the United States* (1902).

GANNETT, WILLIAM CHANNING (1840–) An American Unitarian clergyman, born in Boston, Mass, the son of Ezra Stiles Gannett Graduating from Harvard College in 1860 (A M, 1863) and from Harvard Divinity School in 1868, he at once entered the Unitarian ministry, and was pastor at Milwaukee, Wis (until 1870), East Lexington, Mass (1871–72), St. Paul, Minn (1877–83), and Hinsdale, Ill (1887–89) His last charge, the First Unitarian Church of Rochester, N Y, he held for 19 years, until 1908, when he became pastor emeritus Harvard University conferred upon him the degree of D D in 1908 Dr Gannett came to be known, not only as a leader in his denomination, but as a writer of unusual culture and insight Besides helping to found *Unity* (1878) and serving as one of the editors of *Unity Hymns and Chorals* (1880, rev, 1911), he published a biography, *Ezra Stiles Gannett* (1875), *A Year of Miracle* (1881) *The Childhood of Jesus* (1884), *The Thought of God in Hymns and Poems*, with F L Hosmer (1885, 1904), *The Faith that Makes Faithful*, with J L Jones (1886), *Of Making One's Self Beautiful* (1899), *A Wicket Gate to the Bible* (1907)

GAN'ODON'TA An order of Tertiary mammals, allied to the Edentata (q v), and apparently representing the ancestral forms from which they, or some of them, were derived The oldest type (*Hemiganus*) is found in the earliest Eocene strata of North America and is highly generalized, combining in its skeleton characters now marking the armadillos and

ground sloths It had a full complement of teeth and powerful jaws The next representative is *Psittacotherium* (Upper Puerco beds) and is noticeable for its reduced dentition and the fact that incisors (only one pair in each jaw) have enamel only upon their anterior faces The foot is decidedly edentate *Calamodon* is larger and shows progress towards the modern edentate type, and a still later form, *Stylinodon*, advances this progress A review of the series shows "a gradual diminution of the incisors, a gradual loss of enamel on the teeth generally, and the production of hypselodont teeth growing from persistent pulps, all of which are features of the later edentates" (Beddard) The order, however, includes another family, Conoryctidæ, including the genera *Conoryctes* and *Onychodectes*, whose position with reference to the Edentata is more doubtful Consult Wortman, "The Ganodonta," etc, in *Bulletin of the American Museum of Natural History*, vol ix (New York, 1897), Beddard, *Mammalia* (London, 1902), Scott, *The History of Land Mammals in the Western Hemisphere* (New York, 1913).

GANOI'DEI (Neo-Lat nom. pl, from Gk γάνος, *ganos*, brightness + εἶδος, *eidos*, appearance), or GANOIDEA One of the four orders of fishes in the classification of Agassiz They are characterized by ganoid scales, horny plates covered with enamel, and angular (rhomboidal or polygonal) shiny scales The small number of ganoid fish living at the present time do not form a natural group, for they have been found to be members of the three orders Crossopterygii, Chondrostii, and Holostii, examples of which are, respectively, the bichir (*Polypterus*), the sturgeon (*Acipenser*), and the gar pike (*Lepidosteus*) In Paleozoic and early Mesozoic times ganoid fish were the prominent types of Teleostomes, and their remains are found in abundance in the Carboniferous, Permian, Triassic, Jurassic, and Cretaceous rocks of Europe and North America With the close of Cretaceous time the ganoid types began to disappear and to give way to the teleost fishes, which are the predominating types at present Thus, the ganoid structure is seen to represent an ancient, more primitive stage in the evolution of teleost fishes Some well-known fossil ganoids are: *Holoptychius*, of the Upper Devonian; *Macropoma*, of the Chalk, *Palæoniscus*, of the Permian *Platysomus*, of the Permian, *Catopterus*, of the Triassic shales of Massachusetts, Connecticut, and New Jersey, and *Chondrosteus*, *Lepidotus*, *Eugnathus*, and *Mesturus* See BICHIR, GAR, STURGEON, and the generic names mentioned above

GANONG, gā-nŏng', WILLIAM FRANCIS (1864–) An American botanist, born at St. John, New Brunswick, Canada He graduated from the University of New Brunswick in 1884, from Harvard University in 1887 and received his Ph D from the University of Munich in 1894 He taught botany at Harvard from 1887 to 1893 and in 1894 became professor of botany and director of the Botanical Garden at Smith College He served as secretary of the Society of Plant Morphology and Physiology from 1897 to 1905, and as president of the Botanical Society of America in 1908 He wrote *The Teaching Botanist* (1899, 2d ed, 1910), *Laboratory Course in Plant Physiology* (1901, 2d ed., 1908), and *The Living Plant* (1913), and translated and edited Denys's *Natural History of Acadia* (1908) and LeClerq's *New Relation of Gaspesia* (1910)

GANS, gans, EDUARD (1798–1839) A German jurist, son of a Jewish banker born in Berlin, and educated there, at Gottingen, and at Heidelberg After his conversion to Christianity (1825), he was appointed professor at Berlin (1826) He was a philosopher rather than a jurist, a strong Hegelian, and one of the foremost opponents of the historical method in jurisprudence, as represented by Hugo and Savigny The philosophic theory of jurisprudence is presented by him in *Ueber romisches Obligationrecht* (1819), *Das Erbrecht in weltgeschichtlicher Entwicklung* (1824–35), *System des romischen Civilrechts* (1827), and in his edition of Hegel's *Grundlinien der Philosophie des Rechts* (3d ed, 1854) The Prussian government prohibited his lectures on contemporary history, later published as Vorlesungen uber die Geschichte der letzten funfzig Jahre," in the *Historisches Taschenbuch* (1833–34) His other works include *Vermischte Schriften* (1834), the personal *Ruckblicke* (1836), describing his travels in England and France, and the periodicals *Beitrage zur Revision der preussischen Gesetzgebung* (1830–32) and the Berlin *Jahrbucher fur wissenschaftliche Kritik* (1827), on which Von Ense and Hegel assisted him Hegel, just before his death, quarreled with Gans

GANS, G H. See PUTLITZ

GANSEVOORT, gāns'vōōrt, PETER (1749–1812) An American soldier, born in Albany, N Y On the outbreak of the Revolutionary War he joined the patriot army, and in 1775 was appointed major of the Second New York Regiment He accompanied Montgomery on his expedition against Canada, was made lieutenant colonel in March, 1776, was placed in command of Fort George, on Lake George, in July, became a colonel in November; and from Aug 2 to Aug 22, 1777, defended Fort Schuyler (formerly Fort Stanwix) against St Leger until the arrival of reenforcements under Arnold (See FORT STANWIX) He was a brigadier general in the militia of New York State from March, 1781, until the close of the war, and in 1809 received the same rank in the regular army

GANSFORT. See WESSEL, JOHANNES

GANTANG (gan'tŭng) **PASS** A desolate mountain pass leading eastward from Kunawar, a district of Bashahr, in the Punjab, India, into Tibet Its height is 18,295 feet above the sea, and it is overhung by a peak of its own name about 3000 feet loftier

GANTEAUME, gan'tōm', HONORÉ JOSEPH ANTOINE, COUNT (1755–1818) A French naval officer, born at La Ciotat He entered the navy in 1771 and saw service during the American Revolution In 1794 he attained the rank of captain, in 1798–99 participated in the expedition to Egypt, and, with the rank of rear admiral, commanded the naval forces at the sieges of Jaffa and Acre In 1799 he received the title of Councilor of State In 1800 with seven ships he got out of Brest harbor, past the English blockaders, and did some damage by capturing an occasional man-of-war His fleet entered the Mediterranean early in 1801, but met with no success in repeated efforts to aid the army in Egypt In 1804 he became vice admiral, in 1808 commander of the Mediterranean squadron, and in 1810 a member of the Council of the Ad-

miralty He supported the Bourbons and was elevated to the peerage by Louis XVIII

GANTT, Henry Laurence (1861–) An American mechanical engineer, born in Calvert Co, Md He graduated from Johns Hopkins University (A B) in 1880 and from Stevens Institute of Technology (M E) in 1884, between these dates having taught in the McDonogh School In engineering practice after 1884, he became known as an expert in the installation of the most improved manufacturing methods He was chosen a vice president of the American Society of Mechanical Engineers His *Work, Wages, and Profits* (1910, 2d ed, revised and enlarged, 1913) is well known

GAN'YMEDE (Lat, from Gk Γανυμήδης) According to the *Iliad*, the son of Tros, or, according to other authorities, of Laomedon, Ilus, or Erichthonius The most beautiful of mortals, he was carried to heaven or to Olympus to become a cupbearer of Zeus, he was thus a masculine counterpart to Hebe (q v) The legend gradually developed, and it was the common belief that he had been borne away by the eagle of Zeus, or by Zeus himself in the form of an eagle The rape of Ganymede by the eagle was often portrayed in ancient art, notably in a bronze group by Leochares Ganymede was also identified with the divinity who presided over the sources of the Nile, he was thus cupbearer in heaven and giver of water on earth The Greek astronomers likewise placed him among the stars, under the name of Aquarius (the water bearer)

GANZ, Rudolf (1877–) A Swiss pianist and composer, born in Zurich In his native town he began to study the piano under R Freund and the violoncello under T Hegar, appearing first as a cellist when only 10 years of age In 1893–96 he studied piano with Carl Eschmann-Dumur and composition with Charles Blanchet He then went to Strassburg, continuing his piano study under Fritz Blumer, and in 1899 he was a pupil of Busoni (piano) and H Urban (composition) in Berlin Having made his début as pianist in Berlin in 1899, he came to the United States, where he lived till 1912 From 1900 to 1905 he was head of the piano department of the Chicago Musical College In 1905 he resigned and devoted himself exclusively to the concert stage, playing with great success in recitals and with all the large symphony orchestras of the United States and Canada After he had thus established his reputation in America he toured the principal countries of Europe, meeting everywhere with signal success He is especially fond of placing upon his programmes works seldom performed and new works of merit His compositions include a symphony in E, op 1, a Konzertstuck for piano and orchestra in B, op 4, variations on a theme of Brahms, op 21, male choruses, a number of pieces for piano, and about 150 songs

GAP, gâp The capital of the Department of Hautes-Alpes, France, pleasantly situated on the right bank of the Luye, 84½ miles from Grenoble by rail (Map France, S, L 4). The chief public buildings are the handsome Renaissance cathedral, dating from the seventeenth century, but entirely rebuilt between 1866 and 1905, the bishop's palace, the prefecture building, containing a museum and the marble mausoleum of the Constable de Lesdiguières; a lyceum, a seminary, a library, and a theatre The city has been the seat of a bishop since the fifth century, and for 300 years its bishops ruled as counts palatine over the surrounding district It has a court of assize and a commercial tribunal It manufactures hats, cement, leather, etc Pop, 1901, 11,018, 1911, 10,647 Gap (the ancient *Vapincum*) was formerly capital of a district of Dauphiné to which it gave the name of Gapençais Its decay dates from 1692, when it was sacked and almost wholly reduced to ashes by Victor Amadeus of Savoy

GAPÁN, ga-pan' A town of the Province of Nueva Ecija, Luzon, Philippines It is in a level region 4 miles east of San Isidro The surrounding country produces gold and tobacco Pop, 1903, 11,278

GAPER, gāp'ẽr The soft clam (*Mya truncata*) of Great Britain, highly esteemed as food See Clam

GAPES, gāps (from gape, Icel *gapa*, a yawn) A disease of poultry, due to the presence of a round gapeworm (*Syngamus trachealis*) of nearly universal distribution, in the trachea of gallinaceous birds Many experiments seem to show that the earthworm is a host of the gapeworm, which gains entrance to the fowls when earthworms parasitized by gapeworms are eaten On the other hand, the eggs may develop and grow to adult worms within the trachea of the same fowl A favorite remedy is turpentine applied with a feather inside the windpipe The most effective and convenient method is to make the fowls breathe the dust of air-slaked lime This irritates the mucous membrane of the respiratory passages and produces violent coughing, during which the gapeworms, already affected by the lime, are thrown out During the operation the fowls should be in a box or coop Infested soil should be treated with air-slaked lime and spaded, or with a 1 per cent solution of sulphuric acid before the fowls are allowed to run upon it The feed troughs and water dishes should be scalded and the houses and coops disinfected Potassium permanganate should be used in the drinking water in sufficient strength to give the water a rather deep wine color Consult V Shaw, *Encyclopedia of the Poultry Yard* (New York, 1913)

GAPON, gä-pōn', George (c 1870–1906) A Russian revolutionist He was born at Bilıki in the Government of Poltava, was educated for the priesthood, and began mission work among the factory population of the capital In 1903, according to his own account, he won the consent of the secret police to his plans for organizing labor unions In April, 1904, the St Petersburg Industrial Workers' Association was formally opened, and branches were rapidly organized throughout the city In December, 1904, influenced by the more prominent members of the newly formed labor organization, Gapon became convinced that the reform movement set on foot by the Zemstovs should be backed up by a labor strike, and began systematic propaganda with this end in view His following grew very rapidly, and on Jan 15, 1905, the 12,000 Putilov employees stopped work. For succeeding events, including the massacre of January 22, see Russia Gapon, miraculously saved by his friends from the slaughter at the Narva Gate, was helped to cross the Russian frontier successfully and finally reached London, where he published an account of his life in the *Strand Magazine* Mystery surrounds the rest of his

career On April 11, 1906, the police found in a Finnish villa not far from St Petersburg the body of a man who had either been hanged or had committed suicide, and who was identified as the revolutionary priest On May 2 the St Petersburg newspapers received a letter from Berlin signed "The Secret Tribunal," stating that Gapon had returned to St Petersburg in December and that he had entered into an agreement with the government and the police to reveal the secrets of the revolutionaries For this he had been condemned to death, and sentence had been duly executed Consult Gapon, *The Story of my Life* (London, 1905)

GAR (from AS *gār*, spear) The name of two different sorts of fishes having an external similarity, viz 1 The gars of the family Esocidæ These are round, slender fishes, sometimes 5 feet long, having the jaws prolonged into a stout bill, and studded with sharp teeth, they are found in all warm seas, and are classified in four genera with about 50 species They are voracious carnivorous fishes and powerful surface swimmers, often leaping high out of the water in their eagerness to seize the flying fish The best-known species is the Old World garfish (*Belone vulgaris*), or greenbone, congeners of which dwell in the south Pacific and along the Asiatic coast, a prominent Oriental species is the great *Belone gigantea*, illustrated on the Colored Plate of PHILIPPINE FISHES This genus is characterized by the presence of gill rakers On the tropical American coasts occur many species of the genus *Tylosurus*, popularly known as needlefishes, spearfishes, longjaws, agujones, houndfishes, etc One of these (*Tylosurus marinus*) is common as far north as Cape Cod See AGUJA, and Plate of NEEDLEFISH

2 The fresh-water gars, billfishes, bony pikes, or pikes, which form a family of ganoid fishes (Lepidosteidæ), the only living representatives of the order Rhomboganoidea (See GANOIDEI) They have an elongated, nearly cylindrical body, covered with a bony case of rhomboidal scales. The head, whose external bones are very hard and rugose, terminates in a long beaklike snout, with nostrils near the end of the upper jaw, and the jaws are set with several series of sharp recurved teeth The dorsal fin is set well back, above the anal fin There is a single genus, *Lepidosteus*, comprising five species, inhabiting the lakes and rivers of North America and China The most familiar species is the common billfish or gar pike of the United States (*Lepidosteus osseus*), which under favorable conditions becomes 5 feet long and is numerously found in lakes and rivers from Vermont to Texas. It lives by preying upon other fishes and is not itself good for food It is nocturnal in its activities, and in early summer seeks shallow places in which to lay its eggs, which are glutinous and adhere to the first object they come in contact with When the fry hatches from the egg, it has a row of suckers above a very large mouth with which it clings to submerged stones. The short-nosed gar (*Lepidosteus platostomus*) is smaller and has a shorter bill, it has a northerly range The great or alligator gar, or manjuari (*Lepidosteus tristœchus*), belongs to the Southern States, Cuba, and Mexico, and sometimes reaches 16 feet in length. A fourth species inhabits the west-coast streams of Central America, and a fifth is found in China Cf BICHIR

GARAMANTES, gâr'a-măn'tēz. An ancient people of Garama (Jerma), northwest of Murzuk, in the oasis of Fezzan (Phazania), Tripoli, north Africa This was the southern limit of the Roman Conquest At the end of the seventh century the Arab Mohammedans swept away the vestiges of the Roman power With perhaps a strain of negro blood, there are mixed in the veins of the present inhabitants that of Hamite, Mediterranean, and Semite They are akin closely with the native population of Ghadames, in common with whom they were conquered by the quæstor Cornelius Balbus in the reign of Augustus

GAR'ANCINE (Fr *garance*, Lat *garantia*, madder) A red dyestuff which may be derived from madder, and which was formerly much used on an industrial scale It was originally obtained by Robiquet and Colin in 1827, who treated the ground madder with an equal weight of concentrated sulphuric acid One hundred parts of madder yielded 30 to 40 parts of garancine, which possessed four or five times the dyeing power of madder and therefore dyed more readily, yielding brilliant reds and pinks with yellow tone and lilacs with a gray shade

GARASHANIN, gä'ra-sha'nēn, ILIYA (1812–74) A Servian statesman, born at Garasha He studied at the normal school of Semlin, entered the civil service, was exiled in 1839 for a plot against the Obrenovitch house, but returned in 1842, worked for the election of Alexander Karageorgevitch, and in 1844 became Minister of the Interior From 1852 to 1854 he was President of the Council and in 1857–58 again Minister of the Interior In 1862 he was again at the head of the cabinet, being Minister of Foreign Affairs until 1867 As Minister of the Interior, he inaugurated many reforms, particularly in connection with the system of public education and the administration of justice His policy was strongly anti-Russian

GARAT, gä'ra', DOMINIQUE JOSEPH (1749–1833) A French statesman and man of letters He was born at Bayonne and as a youth came to Paris, where he soon became known as a writer of *éloges* and editor of the *Journal de Paris* After 1786 he enjoyed immense vogue as a lecturer on history at the Lycée He was elected a deputy to the States-General in 1789 Going over to the partisans of the Revolution, he became a slavish adulator of Danton, whom he succeeded as Minister of Justice in 1792, becoming Minister of the Interior the following year He proved himself to be incapable of holding either one of these positions He was imprisoned during the Reign of Terror, but was freed after the fall of Robespierre and became Minister of Public Instruction He was Ambassador to Naples in 1798 and member of the Ancients in 1799 Made a senator and Count by Napoleon, he remained faithful to him after the first Restoration and was consequently ousted by Louis XVIII from the Institute of France, to which he had been elected in 1795 After 1830 he became a member of the newly established Academy of Moral and Political Science Garat's character, like his brilliant literary style, was inherently weak, resting on no steadfast principles He wrote, among other things, *Mémoires sur le Révolution ou exposé de ma conduite* (1795).

GARAT, JEAN PIERRE (1764–1823) A French singer, born at Ustariz. He began to study law and went to Paris to finish his course; but his great talent for music was al-

most immediately recognized, and he was patronized by the Count d'Artois, who introduced him to Marie Antoinette He gave her lessons in singing and became a court favorite During the Revolution he went to Germany with Rode the violinist, where his success was astonishing He returned to France in 1794 and sang in the concerts at the Théâtre Feydeau (1795) He then went abroad again and sang throughout the Continent with equal success About 1796 he was made professor at the Conservatory and was a popular teacher He is said to have been the most wonderful singer France ever produced His voice ranged from tenor to barytone and suited all styles of music

GARAY, gŏr'oi, JÁNOS (1812–53) An Hungarian poet, born at Szegszárd He was an ardent patriot, and all his poems deal with national subjects, although they are formed on German models He held a chair in the University of Pesth for a year (1848) and was librarian there from 1850 until his death His works include *Csatár* (1834), an epic, which made him widely known, and the tragedies *Arbocz* (1837), *Országh Ilona* (1837), *Bátori Erzsébet* (1840), and historical ballads (*Arpádok*, etc) There is an excellent edition of his complete works by Ferenczy (1888), who also wrote his life (Budapest, 1883) Garay's propensity for bombastic declamation has now turned against him the tide of popular favor His lyric poems, however, are not void of genuine feeling His poems were translated into German by Kertbeny (Vienna, 1856)

GARAY, ga-rī', JUAN DE (1541–84). A Spanish soldier, born in Biscay He went to Paraguay about 1565, was appointed secretary to the Governor, made a voyage up the Paraná River, and in 1573 founded the city of Santa Fé de Vera Cruz In 1575 he was made *Adelantado*, and the next year he assumed the government of Paraguay He carried on successful wars against the natives, performing many heroic exploits In 1580 he founded the present city of Buenos Aires, on the site of the earlier settlement of Mendoza While returning to Asunción, he was massacred by hostile natives. In his dealings with the Indians he was humane and beneficent His doings are celebrated by Barco Centenera in the poem *La Argentina* (Lisbon, 1602)

GARB, or **GARBE** (OF *garbe, jarbe*, Fr. *gerbe*, from OHG. *garba*, Ger *Garbe*, sheaf, ultimately connected with Lith *grapti*, Skt *grabh*, to grasp) In heraldry, a sheaf of any kind of grain If it is blazoned simply "garb," wheat is understood, if any other kind of grain is intended, the kind must be mentioned, as a "garb of oats," etc See HERALDRY

GAR'BAGE AND REF'USE, DISPOSAL OF (ME *garbage*, entrails of fowls, probably from OF *garbage*, tribute paid in sheaves, from *garbe*, sheaf) Garbage is a term used in the United States to designate kitchen wastes of animal and vegetable origin, incident to the preparation and serving of food Associated with it there is likely to be more or less inorganic matter, some of which, such as tin cans and bottles, have been in contact with food materials It is not uncommon to place all household wastes, other than sewage, in the garbage can or box, including ashes. In England all the wastes named are classed under the general head of refuse and are placed in a common receptacle, or dustbin Aside from household wastes there are various classes of trade and manufacturing refuse, such as paper, rags, and shavings, also green stuff from vegetable markets, and the odds and ends from butcher shops, such as bones, scraps of meat, grease, and offal.

Much of the organic matter named, when fresh, is similar to, and generally quite as inoffensive as, the food supplies from which it was rejected, but its unstable character renders it liable to offensive decomposition Hence it must be removed promptly from dwellings and other buildings, and so transformed or otherwise disposed of as to give rise to no offense The most primitive means of disposal are dumping on land or in water A slight improvement on these processes is the burning of a portion of the wastes in the open air, but this rarely affects more than certain light combustibles, like paper and shavings, that have been mixed with the garbage proper As the population of a city and its suburbs increases, land disposal becomes intolerable except by burial and finally impracticable by that means The dumping of garbage and refuse at sea is expensive at best, besides being likely to cause the fouling of beaches and harbors

By keeping organic and inorganic wastes in separate receptacles their final disposal is greatly simplified, but the difficulties incident to their storage and prompt removal from the premises of householders is thereby increased Ashes, as they come from stoves and furnaces, are composed of inert inorganic matter, with no harmful or objectionable qualities save those due to dust and dirt In America town ashes seem to be of little use for any purpose except filling, for which they are most excellent, but, with the growing adoption of modern high-temperature refuse destructors, some portion at least of the ashes will probably be taken to the destructor for the sake of the fuel value of the unburned coal Paper, like many other classes of light, dry household and industrial wastes, is not necessarily offensive, but its unsightliness and possible association with organic wastes make its speedy and complete disposal highly desirable Occasionally wastes of this nature are made to yield a revenue sufficient to pay a part of the cost of their collection and disposal

Considering the vast quantities of material and large number of cities and towns concerned, the problem of the final scientific disposal of city wastes is still in its infancy Their collection, however, is on a far better basis, although leaving much to be desired Only a relatively small number of the cities and towns of the world have adopted thoroughly modern sanitary methods of garbage and refuse disposal, and many of the cities falling within this class have made but a beginning as yet Great Britain and the United States seem to be far in the lead in matters of final disposal. Outside of some of the larger American cities, nearly all the improved processes of disposal employ burning in specially designed furnaces In Europe the practice is to make the refuse consume itself without extra fuel In America large quantities of extra fuel were almost always required in the older types of furnaces In Great Britain for many years and now throughout the world in the case of the later installations the destructors are fitted with boilers, which generate steam for use about the plant or for electric lighting, electric power, pumping sewage, or pumping water. Besides utilizing the

heat, the clinkers from the English furnaces are often put to a variety of uses, being ground up and mixed with cement for making slabs or tiles for sidewalks, or being used for the foundations of pavements In the United States but little steam or clinker from destructors had been utilized up to 1914, although means to that end were commonly being provided in new plants. In contrast with the rest of the world, the larger cities of the United States have separated their garbage from other refuse and treated it by reduction processes so as to extract grease and to make the tankage, left after separating the grease and water, into a fertilizer base

Great Britain took the lead in the installation of garbage furnaces, both in point of time and in superior results attained From 1870 to 1876 several crude furnaces were tried In the latter year the city of Manchester put in operation the prototype of the more recent and more successful furnaces, thus antedating by many years the first furnace built for a city in the United States, which was erected at Des Moines, Iowa, in 1887 The practice in America has been, and to a large extent still is, to exclude ashes, tin cans, bottles, old or broken crockery and the like, from garbage. This was partly due to the American practice of feeding garbage or swill to hogs and, in the earlier days, even to cows. Farmers from the surrounding country would gather the swill for their stock, but would refuse that containing foreign matter These food wastes were, and are yet, sometimes gathered by the municipality or by a general contractor and delivered to farmers at the outskirts of the city Originally householders may have received a small sum for their swill, but latterly they have been fortunate if they could get it taken away without expense. At present, collections by or for American farmers are generally restricted to small towns or to the hotels and restaurants of the larger places, but from about 1910 on the practice of feeding garbage to hogs seemed to be on the increase, as did also disposal by dumping and covering with earth, but in both cases for the middle class and smaller rather than the larger cities Properly supervised, either means of disposal may be harmless and without serious nuisance In most cases the garbage should probably be boiled before it is fed to hogs, and it may often be wise to sprinkle it with some chemical agent to keep down flies and odors where garbage is dumped The recovery of salable materials from miscellaneous city wastes (other than garbage and ashes) is on the increase in the United States

Collection Before describing garbage furnaces and reduction plants a few words regarding the collection of city wastes may be said Garbage proper should be collected in carts or boxes provided with water-tight, nonabsorbent boxes or tanks, with closely fitting covers Steel is now considered to be the best material for such tanks Ashes and other dry wastes should be gathered in tight carts, well covered to prevent scattering by jolting or wind. The best material for the ash-wagon boxes, or tanks, is also steel, but this matters comparatively little from a sanitary standpoint, so long as the conditions named are fulfilled The frequency of collection should vary with the character of the wastes and the population Market wastes, the garbage of hotels and restaurants, and of houses in crowded districts, often require daily collection, particularly in the summer Domestic garbage, under ordinary conditions, requires collection from two to three times a week in warm, and once or twice a week in cool or cold weather Ashes, paper, and all other inorganic wastes, so long as not mixed with garbage, may be collected to suit the convenience of the householders and the municipality, the tendency being to increase the frequency with the density of population and consequent lack of room for storage Cleansing or disinfection of garbage cans and wagon boxes or tanks is practiced in the most progressive communities Whether garbage and refuse collection and disposal should be performed by contract or directly by the municipality is a question for each community to settle for itself Many sanitarians favor direct municipal performance, as giving better sanitary results An efficient city government can secure good work under either plan, but perhaps complaints of poor service may receive more prompt attention when the work is done by the municipality In many American cities the collection, and in still more the final disposal, of garbage and refuse is left entirely to private scavengers, under little or no municipal control The results are that the people having most need of good service get none whatever, being unwilling or unable to pay for it, while the work as a whole is generally poorly done The final disposal, under this plan, is almost always a makeshift Whatever may be done as to ashes and inorganic wastes, good sanitation demands that the collection and disposal of garbage, offal, and dead animals should be attended to by the municipality, either under the contract or day-labor system As a matter of economy, it is probable that all the wastes considered in this article should be handled by or under the direction of the city or town.

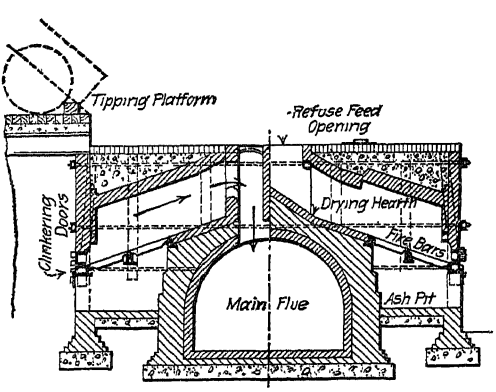
Garbage Furnaces, or Refuse Destructors, as they are called in Great Britain, consist of one or more grates upon which the garbage is burned, ash pits, flues, and chimneys, together with the necessary feeding holes for the garbage, and stoking holes or doors In the best plants a boiler for steam raising is generally used, and it is becoming more and more common to use either steam jets or blowing fans to produce a forced draft To carry heat utilization to the highest possible degree the water feeding the boilers and the air used for forced draft are heated by the gases of combustion before they pass to the chimneys The destructor furnaces are usually composed of small units, or cells, of uniform size, each having a grate surface of 25 square feet Any desired capacity is secured by increasing the number of cells, which are commonly placed back to back, with a central flue Some form of *dust arrester* is often used in the later furnaces to hold back the fine ashes which might otherwise pass up through the chimney and cause a nuisance in the surrounding territory. These are chambers or passages designed to bring the dust to rest and to retain it for future removal The *temperature* of a garbage furnace should be in the vicinity of 2000° F., in order to insure complete combustion and to prevent odors from the chimney gases *Boilers* for utilizing heat from garbage furnaces should not be placed directly over the fire, since the water in the boiler will lower the temperature in the furnaces To avoid this, the boilers are placed between the furnaces and the chimney, or between two

furnaces This causes a loss of heat for steaming, but sanitary considerations should come first

The value of refuse for steam-raising purposes appears to run from 5 to 15 per cent that of coal, assuming a coal that will evaporate 10 pounds of water from and at 212° F per one pound of coal This is omitting extremes Probably 10 per cent is the maximum safe figure upon which to base estimates for continuous work, and even that may be too high

The combined refuse destructor and electric-lighting plant at Shoreditch, England (a part of the administrative county of London), attracted so much attention at the time it was installed that it may be described here as originally built The destructor was opened on June 28, 1897 There are 12 furnaces, or cells, each having a grate area of 25 square feet, six water-tube boilers, with 1300 square feet of heating surface, and a thermal storage tank, 8 feet in diameter and 35 feet long, designed to store water heated by the steam at times of small demand for electric lighting The thermal storage tank does not seem to have been tried at any other garbage furnace and is of questionable value, even if still used at Shoreditch A forced draft, rated at 8000 cubic feet per minute, is supplied by three fans, driven by electric motors The chimney is 150 feet high, with a dust arrester at its base Each furnace has a capacity of 8 to 12 tons of refuse in 24 hours, or 96 to 144 tons in all The aggregate horse power of the connected boilers is about 1200

American garbage furnaces have not been so fully developed as English, such superiority as can be claimed for American sanitary engineers in treating garbage being for the reduction rather than the burning of refuse Just how large a part of the difference between the two countries is due to variations in the character of their respective wastes it is hard to say, since there are few thoroughly satisfactory data on this point, and the English refuse is almost invariably mixed, while in the United States various degrees of separation of garbage, ashes, and other refuse are practiced It is believed that American garbage, even when mixed with ashes, contains more organic matter than does British and that its percentage of moisture is far higher in the summer The moisture must be evaporated before the combustible matter can be burned. A great drawback to the development of American garbage furnaces (and reduction plants as well) is the practice of awarding short-term contracts for disposal, or changing the methods in vogue with each change of city administration Another drawback, happily now losing its force, is the common failure of cities to put their garbage-disposal problems in the hands of competent engineers, or any engineers at all Under all these circumstances it is not strange that American garbage furnaces have not been brought to a higher state of perfection, nor that it is hardly known what they might accomplish in long service under favorable conditions The most successful furnaces in America follow English practice very closely or are actually of the British type Passing with bare mention early plants built after British models at Montreal and San Francisco, Cal, the latter of a rated capacity of 600 tons per day, it may be noted that in the early part of 1906 a combined refuse destructor and electric-light plant was put in operation at Westmount, Province of Quebec, a town of some 12,000 inhabitants The destructor is of the Meldrum type and was imported from Manchester, England Garbage, ashes, and other refuse are collected together by the town, hauled to the disposal plant, and dumped from the carts into a storage hopper, made from steel plates From the base of this hopper the refuse is moved forward a short distance and dropped through top feed holes on a flat drying hearth at the rear of the flat grates of the destructor The refuse may be pushed forward onto the grates from doors at the rear or pulled forward from the stoking doors at the front of the destructor At intervals of two or three hours the clinker formed from the refuse is raked out at the front and dropped through trap doors for removal from below after cooling A relatively small amount of ashes drops through the grates to the ash pits The gases of combustion pass to a 200-horse-power boiler, provided with no other heat, and these are utilized to raise steam for the electric-light plant Two coal fired boilers are available for use when the steam raised by the destructor heat is insufficient to run the lighting plant The destructor is equipped with forced draft to aid the combustion of the refuse and produce a high temperature, and also with a regenerator and an economizer to utilize to the utmost such heat as passes the destructor boiler The regenerator heats air for the forced draft, and the economizer heats the feed water for the destructor boiler An 8½-hour test of the destructor on May 3, 1906, showed an average evaporation of 1 12 pounds of water per pound of refuse burned, equivalent to 1 36 pounds of water evaporated at and from 212° F During the 8 hours and 32 minutes covered by the test

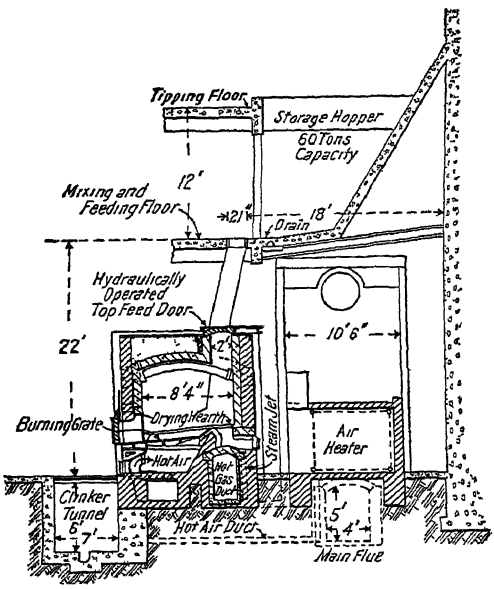


SECTION OF FRYER REFUSE DESTRUCTOR, THE EARLIEST BRITISH TYPE

the destructor burned 38,090 pounds of mixed refuse, of which about 65 per cent was ashes, cinders, and unburned coal, only 15 per cent was garbage, and the balance was of a miscellaneous character The clinker taken from the destructor after the test was 42 per cent, by weight, of the original refuse The three grates together burned the refuse at the average rate of 4402 pounds per hour Each of the three grates has an area of 25 square feet, so the combustion was at the rate of 58 7 pounds per square foot of grate surface per hour. See *Engineering News* (New York) for May 24, 1906

The first permanent English furnaces, built at

Manchester, England, were designed by Alfred Fryer Since then many other styles have been put in use, including the Warner, Horsfall, Meldrum, Heenan and Froude, and Sterling The first American garbage furnace, opened at Des Moines, Iowa, about September, 1887, was designed by Andrew Engle In December of the same year a Rider furnace was fired up at Pittsburgh, Pa The Engle furnace was widely built throughout the United States and subsequently had the Dixon furnace as chief of many rivals Later the Morse-Boulger and the Decarie furnaces came to the front The successful introduction of the British type of furnace at Westmount, already described, was soon followed by the same and other types of British furnaces in Richmond Borough, New York City, Seattle, Milwaukee, and other cities of the United States, and in various Canadian cities The new Milwaukee furnace displaced a furnace of the American type, an improved Engle, built



SECTION THROUGH HEENAN REFUSE DESTRUCTOR AT MONTGOMERY, ALA

only a few years earlier (See *Engineering News*, Jan 23, 1902, and July 21, 1910, for illustrated descriptions of these two Milwaukee plants. The earlier article reviews the varied history of garbage disposal at Milwaukee up to that date) Contracts for British types of destructors for two large American cities were completed in 1914 at San Francisco and Atlanta, Ga

Refuse Sorting and Utilization Plants. Boston has the distinction of being the first city in the United States to install a well-equipped refuse-sorting plant Light refuse from a part of the city was brought to this station, dumped, shoveled onto an inclined conveyor, from which men and boys sorted out various grades of paper, rags, and all other merchantable refuse as the particular kinds passed the person to whom the task of removing it was assigned The residue was dumped automatically into a furnace and readily burned, producing more than enough steam to run the plant. The paper and like salable material were baled ready for shipment At Buffalo a similar refuse-disposal plant was subsequently built and equipped with a boiler to raise steam to pump a portion of the sewage of the city A few other American cities have refuse-sorting plants A 100-ton installation built for a refuse-disposal contractor at Pittsburgh, Pa , was described soon after completion in *Engineering News* of April 30, 1914 It is similar in general object and method to the Boston plant It is housed in a four-story building, about 50 × 200 feet in plan The refuse wagons drive onto the fourth floor, the plant being on a steep hillside, and dump into hoppers which extend down to the picking belt in the story below From the belt the sorted material is thrown into bins, and from these it is taken for baling and packing on the floor below The unsalable material continues upward on the conveyor and is dumped into two high-temperature destructors and burned The heat from these destructors raises steam to generate electric current for works purposes It was expected in 1914 that the surplus current would be sold

Garbage Reduction aims to recover grease and fertilizing material from animal and vegetable household and market wastes, while at the same time affording a sanitary means of final disposal The process requires, for its greatest success, a rigid exclusion of all other wastes from those named, both to reduce the bulk of inert and unprofitable refuse and to prevent damage to the plant The first step is the extraction of grease This is effected by melting with steam heat, combined with pressure, or by means of such solvents as naphtha and benzine Sulphuric acid has been tried and found unsatisfactory. In most of the plants, and for the greater part of the garbage now being treated, steam is used Where a solvent is employed, naphtha is more often chosen than benzine, but the general process is much the same in either case

In the steam plants the grease is extracted in rendering tanks, after which the residue, or tankage, is pressed and then dried to free it from moisture Where naphtha is employed, the drying generally takes place before the solvent is applied The rendering tanks, or digesters, are cylindrical, some 5 feet in diameter and 15 feet high, with tightly fitting covers for the charging holes and a horizontal valve at the foot of the conical bottom, to empty the charge Pipe connections are provided for admitting steam or chemicals, as the case may be, and pipes or other channels for leading away the various liquids after the garbage has been treated for a sufficient length of time, generally a number of hours The tankage is sometimes pressed by steam in the rendering tank and sometimes in presses of either the cheese-cake or roller type The driers are generally steam-jacketed horizontal cylinders, fitted with revolving stirring arms, mounted on a longitudinal axis Grinding mills are sometimes provided for such of the tailings from the screens as are of value, chiefly bones The dried and screened tankage is generally sold to fertilizer manufacturers, but at a few plants phosphates and other rich fertilizers are mixed with it, so as to produce a finished or commercial fertilizer The grease and water are separated by gravity, in tanks, the grease rising to the top and being skimmed off In some cases the grease is refined at the reduction works, but usually there is little attempt to do

much refining It may be shipped to buyers in tank cars or in barrels Where naphtha is used it is recovered by distillation The water from the digesters is sometimes discharged directly into a sewer, stream, or lake In other cases it is evaporated to "stick," and mixed with the dried tankage, increasing the value of the latter, and at the same time not polluting any body of water In the best plants all objectionable vapors are condensed, and the gases are purified by scrubbing, or else conveyed to and burned in the boiler furnaces Reduction plants require an extensive equipment of boilers, engines, pumps, tanks, driers, and other apparatus, the capital charges on which, together with the expenses for fuel and other supplies, and for labor, make up a large total On the other hand, there is a considerable revenue from the sale of grease and tankage. Until 1905 all of the many garbage-reduction plants in the United States were owned by private companies, and information regarding their operating results could not be obtained In 1905 the city of Cleveland, Ohio, bought the reduction plant which had served that city for a number of years, and on July 20, 1910, Columbus, Ohio, put in operation the first reduction plant ever built by a city Each of these Ohio cities prints yearly reports on the financial and other operations of its reduction works which contain much valuable information The reports show that the returns from grease and fertilizer are in excess of operating and capital charges, taking the garbage after it is delivered to the plant (For illustrated description of the Columbus plant, see *Engineering News*, Nov 17, 1910)

Possibly because of the publicity given to the success of the municipal garbage-reduction plants at Cleveland and Columbus, Ohio, several cities let garbage-reduction contracts in 1913, under which they were to receive a revenue from the garbage instead of paying the contractor for the disposal service. Beginning in 1914, New York is paid for garbage delivered by it at the water front, as follows first year, $62,500, second year, $87,500, third year, and also fourth and fifth years, if the contract is renewed at the option of the city, $112,500 a year This is an average of $97,500 a year, as compared with $50,000 a year being paid under the old contract and $130,000 a year bid by the old contractor The saving in five years, under the new contract, would be $1,137,500 In 1913 the city of Los Angeles let a contract under which it was to receive 51 cents a ton for garbage delivered by it to a private reduction plant. This plant was under construction in 1914 Springfield, Mass., is also getting a free garbage-reduction service.

The first reduction plant in the United States was put in use at Buffalo, N Y, in or about the year 1888, under United States patents granted in 1886 to Joseph Merz, of Bruen, Moravia The Merz system was afterward modified by Charles W. Preston and F G Wiselogel Merz patents were taken out in Europe as early as 1882 The patents covered the extraction of grease by use of the lighter hydrocarbons Later the Arnold process was extensively used, and still later the Holthaus, Edson, and other processes As a rule, all recent plants extract the grease by means of steam heat instead of by naphtha, which was used in the Merz process.

Consult Goodrich, *The Economic Disposal of Town's Refuse* (New York, 1901), id, *Refuse Disposal and Power Production* (ib, 1904), id., *Modern Destructor Practice* (Philadelphia, 1912), Maxwell, *The Removal and Disposal of Town Refuse* (London, 1898), Waring, *Street Cleaning and the Disposal of a City's Wastes* (New York, 1897), Baker, *Notes on British Refuse Destructors* (1905), Parsons, *The Disposal of Municipal Refuse* (New York, 1906), Venable, *Garbage Crematories in America* (ib, 1906), Morse, *The Collection and Disposal of Municipal Waste* (ib, 1908)

GARBE, gar'be, RICHARD KARL (1857–) A German Orientalist, born at Bredow, Pomerania He studied at Tubingen, became in 1880 professor at Konigsberg, and in 1895 at Tubingen In 1885–87 the Prussian government defrayed his expenses for travel and residence in India *Indische Reiseskizzen* (1880) chronicles some of his impressions at that time His further publications include an edition (1878) and translation (1878) of the *Vaitâna Sûtra, The Crauta Sûtra of Apastamba* (1882–85), *The Sâmkhya Sûtra Vritti* (1888, Eng trans 1892), *Die Sâmkhya-Philosophie* (Leipzig, 1894), *Philosophy of Ancient India* (1897) *Beitrage zur indischen Kulturgeschichte* (1903), a translation of the *Bhagavadgîtâ* (1905), an edition of Bohtlingk's *Sanskrit-Chrestomathie* (1909), and *Kaiser Akbar von Indien, ein Lebens- und Kulturbild aus dem sechzehnten Jahrhundert* (1909)

GAR'BER, DANIEL (1880–). An American landscape painter He was born at North Manchester, Ind., and studied under Nowottny at the Cincinnati Art Academy and under Thomas Anschutz at the Pennsylvania Academy, Philadelphia. A trip to Europe did much towards overcoming a somewhat dry quality in his earlier work and gave him French ideas of the painting of sunlight—afterward his main interest Among his numerous awards were the first Hallgarten prize of the National Academy (1909), the Lippincott prize, Pennsylvania Academy (1911), and the Palmer prize and gold medal, Art Institute, Chicago He was elected an Associate of the National Academy He is represented in the Corcoran Art Gallery, Washington, the Cincinnati Museum, the Chicago Art Institute, and the Metropolitan Museum, New York In 1909 he became an instructor at the Pennsylvania Academy of Fine Arts.

GARBO, gar'bô, RAFFAELINO DEL. See RAFFAELINO DEL GARBO

GARBORG, gär'bôrg, ARNE (1851–) A Norwegian novelist and publicist, born in the parish of Time, in the District of Jæderen In 1877 he founded the *Fedraheimen*, a journal in the *Landsmaal*, or popular idiom, and his novels and dramas are written in the same language. Among these, nearly all translated into Danish, Swedish, German, French, Finnish, etc, are the following: *A Free Thinker* (1881), *Students from the Country* (1883), *Stories and Traditions* (1884), *Men* (1886), *The Irreconcilables* (1888); *Kolbotn-Letters* (1890), *With Mother* (1890), *Tired Men* (1891), *Peace* (1892), *The Hill-Goblins* (1895), *Jonas Lie* (1893), *The Lost Father* (1899), *The Teacher* (1896), *In Helheim* (1901), *Mountain-Air* (1903), *Knudahei-Letters* (1904), *Jesus Messias* (1906), *Son Returned Home* (1908). He also wrote *The New Norwegian Language and the National Movement* (1877); *Free Discussion* (1888), *Our Struggle for Independence* (1894), *Our Language Evolution* (1897). *Col-*

lected Works appeared (1909 et seq.) —His wife, HULDA GARBORG (1862–), wrote the dramas *Mothers* (1897), *Rational Dairy Practice* (1897), and also *The Woman Created of the Man* (1904) In 1902 she visited the Faroe Islands, and in 1913 traveled through the United States lecturing

GARÇÃO, gar-soun′, PEDRO ANTONIO CORREA (1724–72) A Portuguese poet, born in Lisbon. He was educated at a Jesuit college in Lisbon and the University of Coimbra He aided in the founding of the celebrated "Arcadia" of Lisbon and endeavored to create a better taste in literature by means of his poetry The *Cantata de Dido*, and his satire on the life of Lisbon, the play entitled *Assemblea*, are splendid examples of eighteenth-century Portuguese verse. He is called "the Portuguese Horace" His *Obras poéticas* have gone through several editions, the best, that of Azevedo Castro (Rome, 1888), contains an excellent biography

GARCÍA, gar-sē′a, DIEGO (1471–1529) A Portuguese navigator, born at Lisbon After the discovery of the Straits of Magellan, three ships were fitted out at La Coruña for exploring South America and were placed under the command of García Sailing in 1526, he arrived at São Vincente, Brazil, on Jan. 11, 1527 By exploring the Uruguay and Paraná rivers he gained a knowledge of the Indian tribes of this region He aided the expedition of Sebastian Cabot, which was besieged by natives on the lower Paraná, and in 1528 returned to Spain The account of this voyage is given in the *Memoria de Diego García sobre el viaje que hizo en 1526 y 27*, published in the *Revista de la Biblioteca pública de Buenos Aires*, vol 1 (Buenos Aires, 1879) The island of Diego García, in the Indian Ocean, is said to be named from him

GARCÍA, gar-thē′a, MANUEL (1805–1906) A famous singing teacher, born in Madrid, March 17, 1805 He studied singing with his father, Manuel del Pópolo (q v), and composition with Fétis. His voice, however, was not remarkable, and after a few years he definitely retired from the stage (1829) and settled in Paris, devoting his entire attention to teaching and original scientific investigation of the mechanism of the voice In 1855 he invented the laryngoscope (q v), which made him famous and induced the University of Konigsberg to confer upon him the degree of M D In 1840 he submitted to the French Academy his *Mémoire sur la voix humaine*, a work that attracted considerable attention, so that in 1847 a professorship of singing at the Paris Conservatory was offered to him He then wrote his famous *Traité complet du chant*, which appeared in 1847, and in the same year also in a German translation. In 1850 he accepted the professorship of singing at the Royal Academy of Music in London. For almost half a century he retained this post, and when he resigned in 1895, still in the full possession of all his faculties, he yet continued teaching privately until his very death, which occurred on July 1, 1906, in London. Among his pupils were Jenny Lind, Henrietta Nissen, and the great German singing master Stockhausen Consult S. Macklinlay, *Garcia the Centenarian and his Time* (London, 1908)

GARCÍA, MANUEL DEL PÓPOLO VICENTE (1775–1832). A famous Spanish tenor singer and teacher of singing, born at Seville At six years of age he was a chorister in the cathedral there His teachers were Ripa and Almarcha, whose thorough training, combined with his own great talent, brought him distinction when but 17 in the triple rôles of singer, composer, and conductor After winning an established reputation as a singer in Cadiz and Madrid, he went to Paris (1808) and achieved instantaneous success at the Italian opera In 1811 he proceeded to Italy, meeting with great popular manifestations of public favor The next five years were spent in study, and on his return to Paris, in 1816, disagreement with Catalani, the manageress of the Théâtre Italien, ended in his going to London (1817), where he was enthusiastically received He visited England, South America, the United States, and Mexico, meeting everywhere with unqualified success His compositions included 43 operas, written either in Spanish, French, or Italian His fame as a teacher is enduring, his theories, proven by successful results, forming the groundwork of the best modern teaching Among his pupils the most famous were his own children—a son, Manuel (q v), and two daughters, Marie Malibran (q v) and Pauline Viardot (q v)

GARCÍA, PAULINE VIARDOT See VIARDOT GARCÍA

GARCÍA DE LA HUERTA, VICENTE. See HUERTA, V G DE LA

GARCÍA-GUTIÉRREZ, gar-thē′a-gōō-tyā′-rāth, ANTONIO (1813–84) A Spanish dramatist, born at Chiclana As a youth, he studied medicine at Cadiz, but his bent was always towards literature In 1833 he went to Madrid, where he wrote several plays, but all were failures In 1837 his play *El trovador* was produced and achieved a brilliant success Verdi afterward took this drama as a subject for his opera *Il trovatore* His other works were not so well received, although several of them were finer, especially *Juan Lorenzo* (1865). He was made a member of the Spanish Academy in 1862 His poetry was published under the title *Luz y tinieblas* (2 vols, 1842, 1861) This volume also includes some pretty comedies His plays were published by himself, as *Obras escogidas* (Madrid, 1856)

GARCÍA ÍÑIGUEZ, gar-sē′ä ē′nyē-gäs, CALIXTO (1836–98). A Cuban patriot and soldier, born at Holguin, Santiago Province He began the practice of law, but in 1868 became associated with Donato Mármol as a leader in the Ten Years' War, and soon attained the rank of brigadier general Subsequently, upon the removal of Gen Máximo Gómez by the provisional government, he was appointed commander in chief of the revolutionary forces in Oriente At San Antonio, with a band of 20, he was surrounded by 500 Spaniards, and to avoid capture shot himself through the face, but, having recovered, was deported to Spain and there imprisoned In 1880 he fought with José Maceo in the six months' rebellion known as the "Little War," again was captured, and for 15 years was held in Spain under police surveillance Upon the outbreak of the final insurrection against Spain he escaped in 1895 to Paris and thence went to the United States, where he was active as a filibuster. An expedition fitted out under his direction, and embarked on the *J W Hawkins*, failed through the wreck of the vessel, and $200,000 worth of arms and ammunition was

lost Afterward he succeeded in reaching Cuba on the *Bermuda*, with six field guns and other supplies During the insurrection, as commander of the troops in Camaguey and the Oriente, he won several brilliant victories, and in the Spanish-American War led a Cuban force of 4000 at El Caney (July 1, 1898) He died while in Washington as the head of a commission sent by the Assembly of the provisional government to discuss Cuban affairs with President McKinley

GARCÍA MORENO, gar-sē'a mō-rā'nō, GABRIEL (1821–75) A politician of Ecuador, born at Guayaquil He was educated at the University of Quito and became a professor of chemistry Exiled in 1854, he went to Europe, where he studied political conditions Returning to Ecuador in 1856, he was made mayor and rector of the University of Quito In 1860 he was chosen head of the provisional government, and in 1861 President Though his administration was marked by cruelty and concessions to the ecclesiastical power, yet he organized the finances, regulated abuses, and supplanted militarism with a civil régime In 1865 he declared himself Dictator In 1869, and again in 1875, he was reelected President, but previous to his inauguration in the latter year was assassinated Consult Adolf von Berlichingen, S J, *Don Gabriel García Moreno, Prasident der Republik Ecuador* (Essen-Ruhr, s a.), A Z de Cancio, *Vida del Exemo Sr D Gabriel García Moreno* (Madrid, 1889)

GARCILASO DE LA VEGA (EL INCA). See LASO DE LA VEGA (EL INCA), GARCI

GARCIN DE TASSY, gar'săN' de ta'sē', JOSEPH HÉLIODORE SAGESSE VERTU (1794–1878) A noted French Orientalist He was born in Marseilles, studied Oriental languages in Paris as a pupil of the distinguished Silvestre de Sacy, and in 1828 was appointed to the chair of Hindustani especially founded for him at the Ecole des Langues Orientales, which he occupied until his death In 1838 he was elected to succeed Talleyrand in the Académie des Inscriptions et Belles-Lettres Subsequently he became president of the Société Asiatique and an administrator of the Ecole Originally known as a student of Mohammedanism and a translator from the Arabic, he was later recognized as the foremost European savant in the undeveloped and difficult field of the Hindustani language and literature His annual review, *La langue et la littérature hindoustanies* (1872–77), was authoritative, not only throughout Europe, but as well among native Indian scholars Among his publications, which include many translations, are the following *Les oiseaux et les fleurs* (1821), Arabic text, with translation; *Relation de la prise de Constantinople*, translated from Turkish (1826), *Les aventures de Kamrup*, Hindustani text (1834), *Les œuvres de Wali*, with text, translation, and notes (1836), *La poésie philosophique et religieuse chez les Persans* (1857), his chief work, a *Histoire de la langue et de la littérature hindoues et hindoustanies* (2d ed, 3 vols, 1871), *Rhétorique et Prosodie des langues de l'Orient musulman* (2d ed., 1873), *L'Islamisme selon le Coran* (1874) He also prepared a French edition (1845) of Sir William Jones's *Grammar of the Persian Language* (1771)

GARCIN'IA See MANGOSTEEN

GARD, gär A department of France, in Languedoc, bounded on the east by the river Rhone, and reaching into the Mediterranean, in a headland having a coast line of 10 miles (Map France, S, J 4) Area, 2270 square miles Pop, 1901, 420,836, 1911, 413,458 A considerable part of the surface is occupied by forests, plantations, and vineyards On the coast there are extensive and unhealthful marshes It is watered mainly by the Rhone and its tributaries—the Gard, the ancient Vardo (from which the department has its name), and the Cèze The northwest is occupied by a branch of the Cévennes Mountains, the remainder slopes towards the Rhone and the Mediterranean The soil is in general dry, the best lands occurring in the river valleys Coal, iron, lead, and zinc are found in several places, and salt is manufactured in the south The vine, the olive, and the mulberry are extensively cultivated The silk industry is important and the department produces more silkworms than any other in France Lignite is worked in the northeastern part of the department Wine is largely exported The department is divided into the four arrondissements of Nîmes, Alais, Uzès, and Le Vigan Capital, Nîmes

GARDA, gär'da (Lat *Lacus Benacus*). The largest lake in Italy, 216 feet above sea level It is 34 miles long, from 3 to 11 miles broad, 189 square miles in area, and its greatest known depth is 1916 feet (Map Italy, C 2) Its northern extremity is in Tirol, and Peschiera, at its southern extremity, is 16 miles west of Verona and 77 miles east of Milan There is a communication by steamboat once or twice daily between different points on the lake The principal fish are salmon trout, trout, pike, and eels The water is often rough, especially when there is a storm from the north (Consult Vergil, *Georgics*, ii, 160) The southern shores are low and flat, but, as the lake narrows towards the north, the spurs of the Alps rise boldly from the water's edge The chief tributary is the Sarca from the glaciers of Adamello, and the only outlet is the Mincio, which descends from Peschiera to Mantua and discharges into the Po

The most fashionable resort is Gardone-Riviera, but dearest to the poet and to the antiquarian is Sirmione, a narrow promontory that extends 2½ miles out into the lake The view from it is magnificent, and there are the ruins of Roman baths and of a building said to be the villa of the poet Catullus. Salò, a small town with terraces of lemon groves, has a church containing several interesting paintings; Maderno has a basilica of the eighth century Malcesine is the place where Goethe was arrested by the Venetian officials To the beautiful little village of Garda the lake owes its name Riva, at the north end of the lake, in Austrian territory, is popular with tourists, on account of its hotels, ruins, and climate in summer It is the starting point for numerous excursions over the mountains Consult R Bagot, *The Lakes of Northern Italy* (New York, 1907), W D McCrackan, *The Spell of the Italian Lakes* (Boston, 1913).

GARDAIA, gar-dī'a, or **GHARDAYA** (locally, Faghardeit) An important trading point of the Sahara, and the chief town of the Mzab District in Algeria, situated on a hill in the oasis of Gardaia, amid rocky mountains, 312 miles in a direct line south-southeast of Algiers (Map Africa, E 1) It is fortified by a wall surmounted with towers and pierced by gates; possesses several mosques, one remarkable for

its size, and has a flourishing caravan trade with Tunis, Algiers, Fez, Morocco, Sudan, and Timbuktu, in slaves, barley, dates, pottery, provisions, oil, wool, cotton, indigo, leather, gold dust, ivory, and all the varied raw products of central and northern Africa Its trade is for the most part in the hands of Jews, who inhabit a separate quarter The population consists chiefly of the Beni Mzab, who speak a Berber dialect modified by Arabic Gardaia is surrounded by date-palm orchards containing over 64,000 trees and is irrigated by artesian wells In the vicinity are the ruins of a Roman tower and the foundations of a temple dedicated to Isis were uncovered in 1910 The Mzab Confederation, formerly independent, has acknowledged the sovereignty of France since 1850 In 1857 Gardaia, its capital, was surrendered to the French and was made a military station Pop, 1901, 9315, 1911, 8551, of the oasis about 36,000

GARDANE, gar'dan', CLAUDE MATTHIEU, COUNT (1766–1818). A French general and diplomat He became a captain in 1793, a brigadier general in 1799, and aid-de-camp to Napoleon in 1805 In 1807 he was sent by the Emperor on a diplomatic mission to Persia to strengthen a Franco-Persian alliance with the view of a future invasion of India Returning to France in 1809, he was created Count of the Empire and was sent to join Massena's army in Portugal, where he came into disfavor as a result of his conduct during the retreat from Santarem to Almeida Consult P A L de Driault, *La politique orientale de Napoléon· Sébastiani et Gardane* (Paris, 1904)

GARD'ANT, *Fr. pron* gar'dan' (Fr, gazing, pres p of *garder*, to look) In heraldry (q v), a term used of an animal in fess and represented full-faced

GARDE, gar'dĕ, THOMAS WILLIAM (1859–) A Danish naval officer, distinguished for his explorations in Greenland With Holm (q v) he thoroughly explored the coast of southeast Greenland in 1883–85, by boat journeys from Cape Farewell Garde explored Lindenows Fiord, 62° 15′ N, where have been found the Scandinavian ruins on the east coast Wintering at Nanortalik, he discovered between that place and Cape Farewell 200 live glaciers, of which 70 had a sea face more than a mile wide During his surveys of the Julianahaab district, southwest of Greenland, in 1893, he made a long journey over the Greenland ice cap, which proved to be of unsuspected height. In his trip of 13 days he traveled 180 miles across the ice and reached an elevation of more than 8000 feet He was awarded the Roquette medal by the Société de Géographie of Paris He became a commander in the Royal navy, chief of staff, and from 1908 to 1911 was Assistant to the Minister of the Navy Garde's narratives of his explorations appeared in *Meddelelser om Grønland*, ix, xvi

GAR'DEN, ALEXANDER (1730–91). An American physician and naturalist, born in Charleston, S C, and educated in Scotland He was a professor in King's College (now Columbia University) in 1754 and in 1755 settled as a physician in Charleston At the time of the Revolutionary War he sided with Great Britain and in 1783 emigrated to London, where he lived until his death He wrote a number of papers on zoological and botanical subjects The genus *Gardenia* was named in his honor

GARDEN, ALEXANDER (1757–1829) An American soldier and writer, born in Charleston, S C, and educated at Westminster and at Glasgow, Scotland On the outbreak of the Revolutionary War he joined the patriot party, and he served in Lee's Legion, and was volunteer aid-de-camp to General Greene He received the confiscated estates of his father, the botanist and Loyalist (see preceding title) He is known chiefly as the author of *Anecdotes of the Revolutionary War, with Sketches of the Character of Persons Most Distinguished in the Southern States for Civil and Military Services* (1822–28, last ed, 3 vols, 1868)

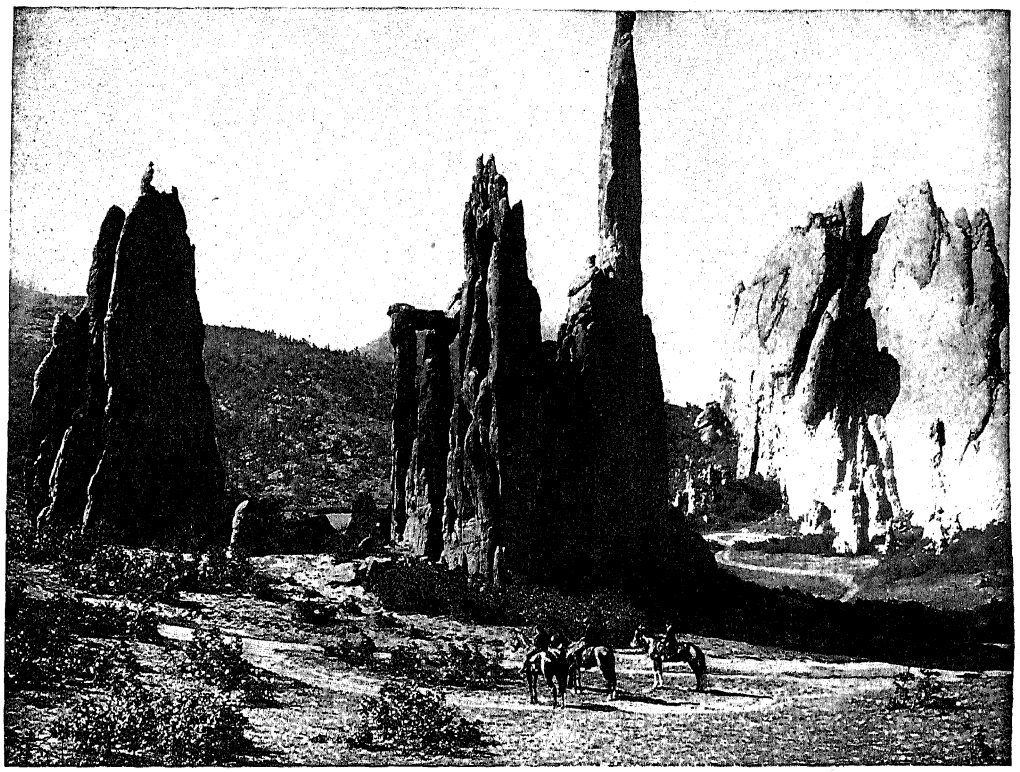
GARDEN, MARY (1877–) An American dramatic soprano She was born at Aberdeen, Scotland, but at a very early age went with her parents to Chicago Her love for music found its earliest expression through the violin, which she began to study in her sixth year At the age of 12 she took up the piano In 1893 she placed herself under the instruction of Mrs Duff, of Bangor, Me, with the intention of becoming a singer After two years of earnest work she went to Paris, where she continued her vocal studies under Trabadello and Fugère Her début was made, in 1900, at the Paris Opéra Comique in Charpentier's "Louise" She immediately became a great favorite with the French public, and in 1902 was chosen to create the part of Mélisande in Debussy's opera From the time of her first appearance in the United States (1908) at the Manhattan Opera House she was a prime favorite with American opera goers From 1910 to May, 1914, she was a member of the Chicago Opera Company Although her repertoire is rather limited, being restricted almost exclusively to modern French operas, she is an artist of compelling power Her vocalism may not be above criticism, but for subtle delineation, plastic pose, spontaneity, and minutest attention to detail she is unsurpassed

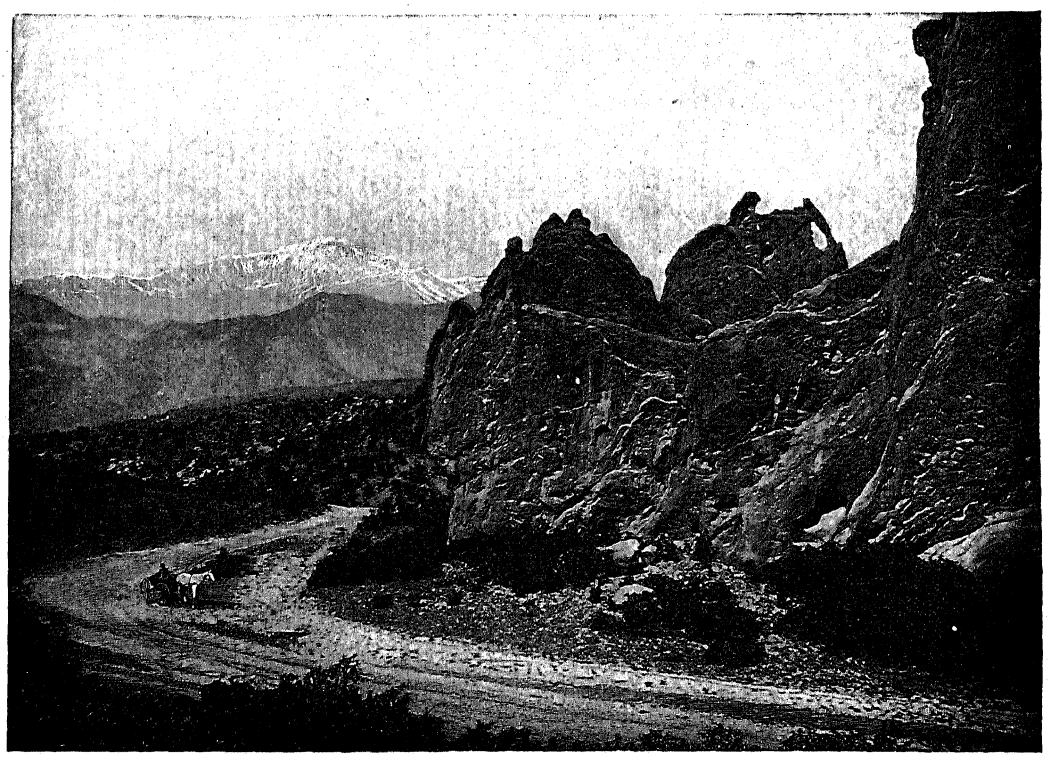
GARDE NATIONALE, gard na'syō'nal' See NATIONAL GUARD

GARDEN CITY A popular name for Chicago, from its numerous parks and gardens

GARDEN CITY. A city and the county seat of Finney Co, Kans, 50 miles west by north of Dodge City, on the Atchison, Topeka, and Santa Fe Railroad (Map Kansas, B 7) It contains a public library, and has municipal water works and electric-light plant The city is in an agricultural and stock-raising region It has extensive irrigating works, being the centre of the irrigation system of southwestern Kansas and of a beet-sugar industry A trade is also carried on in alfalfa and dairy products The commission form of government became operative in Garden City in 1914 Pop, 1900, 1590, 1910, 3171

GARDEN CITY. A village in Nassau Co, N Y, 20 miles from New York, on the Long Island Railroad (Map New York, B 2) It was projected by A T Stewart as a model suburban village, and is the seat of the Protestant Episcopal Bishop of Long Island, with the cathedral schools of St Paul's and St Mary's The Cathedral of the Incarnation is a fine specimen of Gothic architecture, erected by Mrs Stewart in honor of her husband. It has a magnificent organ, one of the largest in the world, costing $100,000 A large publishing house is the chief industrial establishment Pop, 1914 (local est.), 1000





"THE GARDEN OF THE GODS"

CATHEDRAL SPIRES (UPPER)
THE SEAL AND BEAR (LOWER)

GARDENER, LION See GARDINER

GARDENER BIRD See BOWER BIRD

GARDE'NIA (Neo-Lat, from Alexander Garden) A genus of trees and shrubs of the family Rubiaceæ, natives of tropical and subtropical countries, many of which are now favorites in greenhouses and hothouses, on account of their beautiful and fragrant flowers Some of them are hardy enough to endure the open air in summer The corolla is funnel-shaped, or approaching to salver-shaped, the tube much longer than the calyx, the fruit, a berry, crowned with the calyx The name Cape jasmine is given to *Gardenia jasminoides*, now known as *Gardenia florida*, a Chinese species well known in America The fruit, which is about the size of a pigeon's egg and orange colored, is sold in the shops of China and Japan for dyeing silks yellow A beautiful yellow resin exudes from wounds in the bark of *Gardenia gummifera*, an East Indian species The wood of *Gardenia thunbergii* and *Gardenia rothmannia* is very hard, and is used for agricultural implements, wheel axles, etc, at the Cape of Good Hope Both of these species are grown in American hothouses See JASMINE

GAR'DENING See HORTICULTURE

GARDEN ISLAND An island of Western Australia, measuring 6 miles by 1, and situated near the mouth of Swan River, in lat 30° 10′ S and long 115° 40′ E It shelters from the open ocean the deep and spacious anchorage of Cockburn Sound, thus contributing to make Fremantle the most important port of western Australia

GARDEN OF ENGLAND Worcestershire so named because of its fertility

GARDEN OF EUROPE A frequent designation for Italy, from its fertility, climate, and scenery

GARDEN OF FRANCE A name sometimes used of the ancient Province of Touraine

GARDEN OF ITALY A popular designation of Sicily, because of its fertility and scenery

GARDEN OF THE GODS The name given to a region in Colorado, near Colorado Springs, covering about 500 acres and remarkable for the strange forms of the rocks with which it is covered The red and white sandstone here assumes grotesque shapes to which various names have been given The Gateway is formed by two huge masses of rock, of a bright red color, and 330 feet high, between which the road passes

GARDEN OF THE HESPERIDES. See HESPERIDES

GARDEN SNAIL. The British name of the large, brightly colored land snail (*Helix aspersa*), common and sometimes troublesome in gardens throughout Europe It is edible when well cooked, but not so often eaten as another species (*Helix pomatia*), known and cultivated as the "edible" snail Some interesting folklore attaches to this species in the rural districts of England and Scotland See SNAIL, with accompanying Colored Plate of NORTH AMERICAN SNAILS

GARDENS OF ADONIS See ADONIS

GARDENS OF CÆSAR. See CÆSAR, GARDENS OF

GARDENS OF LUCUL'LUS. See LUCULLUS, GARDENS OF

GARDENS OF MÆCE'NAS. See MÆCENAS, GARDENS OF

GARDENS OF SAL'LUST. See SALLUST, GARDENS OF

GARDEN VEGETABLES See VEGETABLES, and separate articles on individual crops, e g, BEAN, CABBAGE, LETTUCE, PEA, ETC

GARDEN WARBLER An English name of a small brownish warbler (*Sylvia borin*, or *hortensis*) of Southern Europe, called in England "greater pettychaps," familiar about gardens, and noted for its sweet and varied song, whence the Germans call it "false nightingale." It is often caged under the French name *fauvette*, but does not endure captivity well This is the bird known to the Italians as *beccafico* (q v), because it punctures the ripening figs, as illustrated in the article FIG

GARDE SUISSE, gärd swēs See SWISS GUARD

GARDIE, gär'dē′, MAGNUS GABRIEL DE LA (1622–86) A Swedish statesman, born in Reval He studied at the University of Upsala, was a great favorite of Christina, in 1646 was special Ambassador to France, and subsequently commanded the Swedish army in Livonia During the minority of Charles XI he was Lord Chancellor, a member of the council of regency, and leader of the war party and the subsidy policy which made Sweden an ally of France In 1682 he retired after the unfavorable report of a special commission on the conduct of the regency He founded (1667) the Upsala College of Antiquities and gave to the University of Upsala the famous Codex Argenteus (See ULFILAS) His collection of manuscripts was acquired in 1848 by the library of the University of Lund

GARDINER, gärd'nēr A city in Kennebec Co, Me, 6 miles south of Augusta, on the Kennebec River, on the Maine Central railroad, and on the line of the Eastern Steamship Company (Map Maine, C 4) Naturally endowed with excellent water power, it has saw, paper, and pulp mills, a sash and blind factory, foundries and machine shops, shoe factories, and manufactures of electric-railroad supplies Lumber and ice are largely exported There is a public library Settled in 1760, Gardiner was part of Pittston until 1803, when it was incorporated as a town It was chartered as a city in 1849 Gardiner adopted the commission form of government, which became operative in 1912 The city owns its water works Pop., 1900, 5501, 1910, 5311 Consult Hanson, *History of Gardiner, Pittston, and West Gardiner* (Gardiner, 1882).

GARDINER, FREDERIC (1822–89) An American Episcopalian scholar He was born at Gardiner, Me, Sept 11, 1822, graduated at Bowdoin College, 1842, entered the Protestant Episcopal ministry, was professor in the Berkeley Divinity School at Middletown, Conn, from 1868 to his death, July 17, 1889 He was one of the best Bible students of his day, and his publications include commentaries upon Leviticus, 2 Samuel, Ezekiel, and Jude, a harmony of the Gospels in Greek and in English (1871), *The Principles of Textual Criticism* (1876), *The Old and New Testaments in their Mutual Relation* (1885), *Aids to Scripture Study* (1890)

GARDINER, HARRY NORMAN (1855–). An American professor of philosophy. He was born at Norwich, England, went to the United States in 1874, graduated from Amherst College in 1878; and also studied at Union Theological Seminary, Gottingen, Leipzig, and Heidelberg He taught at Glens Falls (N Y.)

Academy in 1878–79, was instructor in psychology at Amherst in 1891–92, and served as instructor at Smith College from 1884 to 1888, when he became professor of philosophy In 1907 he was president of the American Philosophical Association He published *Outlines of Modern Philosophy* (1892), and edited *Jonathan Edwards—A Retrospect* (1901) and *Selected Sermons of Jonathan Edwards* (1904)

GARDINER, JAMES (1688–1745) A daring Scottish soldier, famous for his remarkable religious experience He was born at Carriden Linlithgowshire, Scotland When only 14 he obtained a commission in a Scottish regiment in the Dutch service In 1702 he entered the English army, and fought with distinction in the campaigns of Marlborough He was promoted to the rank of major in 1718 Up to this time his life had been extremely dissolute But in 1719, while bent upon pleasure, he happened to take up a religious book, and while reading it saw what he considered a vision of Jesus Christ He was immediately converted and thenceforth lived a pious and excellent Christian life He became colonel in 1743, and two years later was mortally wounded in the battle of Prestonpans. Consult Doddridge, *Some Remarkable Passages in the Life of Col J Gardiner* (London, 1747, many later editions), and Carlyle, *Autobiography*, edited by Burton (Edinburgh, 1860)

GARDINER, JOHN (1731–93) An American lawyer, the son of Dr Sylvester Gardiner He was born in Boston, studied law, and practiced his profession for a time in London and in Wales A friend of John Wilkes, he appeared as junior counsel of the latter in 1764 In the Massachusetts Legislature he procured the abolition of the law of primogeniture in Massachusetts and the prohibition of special pleading, and worked for the repeal of the antitheatrical laws He was one of the leaders of the original Unitarian movement in Boston

GARDINER, JOHN STANLEY (1872–). An English zoologist, born in Belfast He was educated at Marlborough College and at Gonville and Caius College, Cambridge, of which he became fellow in 1898 and was dean in 1903–09 He was university lecturer on zoology and professor of zoology and comparative anatomy He took part in several scientific expeditions—to Funafuti (1896), Maldives and Laccadives (1899–1901), Indian Ocean (1905), and Seychelles (1908), wrote on the Indian Ocean and the Seychelles for different reviews, especially the *Geographical Journal*, and edited *Fauna and Geography of the Maldive and Laccadive Archipelagoes* (1902–06)

GARDINER, or **GARDENER,** LION (1599–1663) An English settler in America He was a military engineer, and saw service in the Netherlands under the Prince of Orange In 1635 he arrived at Boston under contract to serve for four years a company which had the patent of a tract of land at the mouth of the Connecticut River. There he built a fort which he called Saybrook, and remained in command until 1639, when he bought from the Indians the island called by him the Isle of Wight, now known as Gardiner's Island, the first English settlement within the present limits of the State of New York To his little domain of 9 miles in length by 1½ miles in width he gained proprietary rights as lord of the manor In 1653 he removed to Easthampton, Long Island, with others who had bought 30,000 acres there in 1649 His *Relation of the Pequot Warres*, written in 1660, was edited by Carlton (Hartford, 1901) with valuable notes Consult also C C Gardiner, *Papers and Biography of Lion Gardiner* (St Louis, 1883), and the same author's *Lion Gardiner and his Descendants* (ib, 1890)

GARDINER, SAMUEL RAWSON (1829–1902) An English historian He was a descendant of Cromwell and Ireton, was born at Ropley, near Alresford in Hampshire, March 4, 1829, and was educated at Winchester and at Christ Church, Oxford, where he was awarded a first class in *literæ humaniores* In 1884 he was elected a research fellow of All Souls, and in 1892 he was awarded a similar fellowship at Merton From 1877 to 1885 he was professor of modern history at King's College, London, and was examiner in history at Oxford University, 1886–89 On the death of Froude, in 1894, he was offered, but declined, the regius professorship of modern history at Oxford On Aug 16, 1882, he was granted a Civil List pension of £150 He was the recipient of several honorary degrees—LL D (1881) from Edinburgh, D C L (1895) from Oxford, and Litt D (1899) from Cambridge Gardiner's first important work was his *History of England from the Accession of James I to the Disgrace of Chief Justice Coke, 1603–1616* (2 vols, 1863) Subsequent installments appeared at various intervals until 1881, when they were reissued in a revised collective edition, the earlier volumes much altered, under the title *History of England from the Accession of James I to the Outbreak of the Great Civil War, 1603–1642* (10 vols, 1883–84) The *History of the Great Civil War* appeared in 3 vols (1886–91), and was reissued in a slightly revised form for the collective edition in 4 vols (1893) The third and last installment of the great combined work, under the title *History of the Commonwealth and Protectorate*, of which three volumes, including the year 1656, appeared in 1894–1901, was arrested by Mr Gardiner's death, which occurred Feb 23, 1902 He was the first English writer to treat this controversial period in detail from a nonpartisan standpoint His work rests upon the most laborious and exhaustive study of all the sources of the period which has been attempted In this his efforts were lightened for the earlier part of the work by the various *Calendars of State Papers* still in process of publication He was also greatly favored by numerous discoveries of new material, among which the most important are that of the great collection known as the Clarke manuscripts in the library of Worcester College, Oxford, the Verney manuscripts, the "Paston Letters" of the seventeenth century, the "Nicholas Papers," the "Hamilton Papers," and the secret correspondence of the papal agent Rossetti in England with Cardinal Barberini In the history of the Long Parliament Mr Gardiner explains adequately for the first time the rise of the Cavalier party, and the division, growing into the Civil War, which arose from differences of opinion in matters of religion Besides his great work, Mr. Gardiner edited numerous volumes for the Camden Society, and contributed many articles and reviews to the *English Historical Review*, of which he was editor from 1891 to 1901 He summarized the results of his labors in the following recent works· *Cromwell's Place in History* (1897), *Oliver Cromwell*, a biography first published in

an elaborately illustrated volume (1899) and afterward in a cheaper form without the illustrations (1901). Other works are *Constitutional Documents of the Puritan Revolution* (1889, 2d ed, 1899), *What the Gunpowder Plot Was* (1897), *The Thirty Years' War, 1618–1648* (1874), *The First Two Stuarts, and the Puritan Revolution, 1603–1660* (1876) The following are textbooks *A Student's History of England* (3 vols, 1890–92), with Mullinger, *Introduction to the Study of English History* (1881, 3d ed, 1894) Consult Shaw, *Bibliography of the Historical Works of Dr Creighton, Dr Stubbs, Dr S R Gardiner* (London, 1903)

GARDINER, STEPHEN (?1483–1555) An English prelate and statesman, born between 1483 and 1493 He was the son of John Gardiner, a prosperous cloth worker at Bury St. Edmunds, and studied at Trinity Hall, Cambridge, where he distinguished himself in classics In 1520 he became doctor of civil law, next year of canon law, and in both branches speedily attained eminence In 1524 he was appointed Rede lecturer in the university, and the same year became tutor to a son of the Duke of Norfolk That nobleman introduced him to Cardinal Wolsey, who made him his secretary In this capacity he gained the confidence of Henry VIII, and in 1527 he and Sir Thomas More were the English commissioners for negotiating with the French ambassadors regarding the maintenance of an army in Italy to oppose the Emperor The year following he was sent with Edward Fox to negotiate with the Pope for the King's divorce from Catharine of Aragon His arguments were unavailing, but on his return he was appointed the King's secretary In 1531 he was appointed Archdeacon of Leicester, and the same year was installed Bishop of Winchester, vacant by Wolsey's death. A determined opponent of the Reformation and a stanch Catholic, he nevertheless wrote *De Vera Obedientia* (1535) in support of the King's supremacy Various embassies to France and Germany were now intrusted to him, and after the execution of Thomas Cromwell, Earl of Essex, whose downfall was due mainly to him, he acquired great power The tale of his impeachment of Catharine Parr and subsequent disgrace by Henry VIII is doubtful, but on the accession of Edward VI he was imprisoned for his opposition to the Reformation and deprived of his bishopric When Mary came to the throne in 1553 she restored him to his see, and made him Lord Chancellor and Prime Minister He officiated at the Queen's coronation, and at her nuptials with Philip of Spain. How far he was responsible for the persecution of Protestants during her reign is a debated question He was a man of great erudition, and a friend of learning in every form His writings consist of a number of tracts on theological and literary subjects, and include his interesting letters to Sir John Cheke against the Anglicizing of Greek pronunciation Although a worldly-minded ecclesiast, he was a devoted and zealous worker, and conspicuous for religious consistency He died Nov 12, 1555 Consult Cassan, *Lives of the Bishops of Winchester*, 2 vols. (London, 1827); Cooper, *Athenæ Cantabrigiensis*, vol ii (Cambridge, 1858), for his writings, Gairdner, *Letters and Papers . of the Reign of Henry VIII* (15 vols, London, 1862–96), Brewer, *Reign of Henry VIII* (2 vols, London, 1884); Maitland, *Essays on the Reformation in England* (London, 1849), Dixon, *History of the Church of England* (4 vols, London, 1878–91); Froude, *History of England* (12 vols, New York, 1870)

GARDINER, SYLVESTER (1707–86). An American physician He was born in South Kingston, R I, studied medicine in Paris and London, and began practice in Boston He was instrumental in colonizing that part of the "Plymouth Purchase" lying along the Kennebec River, and in settling the town of Pittston, Me, from which the present city of Gardiner, named in his honor, was subsequently set off He established a church and library there, and was a leading member of King's Chapel, in Boston On the outbreak of the Revolutionary War he joined the Loyalist element in Boston, and in 1776 removed to Halifax, N S, whence he subsequently removed to England, his name having meanwhile been included in the proscription and banishment act of 1778 In 1785 he returned to this country, and settled at Newport, where he died

GARDINER'S ISLAND A portion of Suffolk Co, N Y, lying 5 miles off Long Island on the south side of the east entrance of Long Island Sound, in the bay formed by the two arms of Long Island (Map New York, C 2) It has an area of 3300 acres It has been the property of the Gardiner family since it was bought from the Indians by Lion Gardiner in 1639 It was on this island that the noted pirate (or privateer) Captain Kidd secreted some of his treasure, which was afterward discovered and appropriated

GARDNER A town in Worcester Co, Mass (Map Massachusetts, D 2), including the villages of Gardner Centre, South Gardner, and West Gardner, 27 miles northwest of Worcester, on the Boston and Maine Railroad It has the Henry Heywood Memorial Library and Museum, the Henry Heywood Memorial Hospital, a State colony for the insane, an almshouse, and a home for the aged, and Dunn and Crystal Lake parks It is the seat of an extensive chair-manufacturing industry and has also manufactories of go-carts, oil stoves, silverware, furniture, harness, steam heaters, machinery, concrete blocks and bricks, tinware, time recorders, etc The government is administered by town meetings, convened whenever necessary Gardner was incorporated as a town in 1785, its population then being about 375 The water works are owned by the municipality Pop, 1900, 10,813; 1910, 14,699, 1914 (U S est), 16,353, 1920, 16,971.

GARDNER, EDMUND GARRATT (1869–) An English writer on Italian literature He was born in London, was educated at Gonville and Caius College, Cambridge, and studied medicine, but devoted himself to the study of Dante, Italian history and literature, and mysticism He wrote *Dante's Ten Heavens* (1898), *A Dante Primer* (1900), *The Story of Florence* (1900), *The Story of Siena and San Gimignano* (1902), *Dukes and Poets in Ferrara* (1904), *The King of Court Poets* (1906), *St Catherine of Siena* (1907), *The Painters of the School of Ferrara* (1911), *Dante and the Mystics* (1913)

GARDNER, ELIZABETH JANE (MME W A BOUGUEREAU) (1842–) An American figure painter, born at Exeter, N H She studied in Paris under Merle, Lefebvre, and finally under Bouguereau, whom she afterward married, and whose manner she adopted so successfully that some of her work might be mistaken for his.

Like him she excels in graceful draftsmanship and tender sentiment, but is deficient in color, truthfulness, and vitality Among the best of her works are "Cinderella," "Cornelia and Her Jewels," "Corinne," "Fortune Teller," "Maud Muller," "Daphne and Chloe," "Ruth and Naomi," "The Farmer's Daughter," "The Breton Wedding," and some portraits

GARDNER, Ernest Arthur (1862–). An English classical archæologist, born in London He was educated at the City of London School, and at Gonville and Caius College, Cambridge, of which he was fellow 1885–94 After 1884 he devoted himself to archæological work, and was director of the British School of Archæology at Athens (1887–95) He became Yates professor of archæology in University College, London, and public orator of the University of London (1910) He conducted the excavations at Naucratis in Egypt (1885–86), and carried on explorations in Cyprus, in Samos, at Megalopolis, and on many other sites in Greece His publications include *Catalogue of Vases in the Fitzwilliam Museum* (1897), *Ancient Athens* (1902), *Introduction to Greek Epigraphy*, with E S Roberts (1905), *Six Greek Sculptors* (1910) He was a frequent contributor to archæological journals, and in 1897 became coeditor of the *Journal of Hellenic Studies*

GARDNER, George (1812–49) A Scottish botanist, born in Glasgow He studied at the University of Glasgow, qualified as a surgeon, turned his attention from medicine to botany, and, assisted by subscriptions obtained in great part through the influence of his instructor, Sir W J Hooker, explored Brazil from May, 1836, to the close of 1840 During his absence he forwarded to England 60,000 specimens divided among 3000 different species His total number of specimens represented more than 6000 different species In 1842 he was elected a member of the Linnæan Society of London, in 1844 was appointed superintendent of the botanical garden of Ceylon, and in 1845 visited India for botanizing purposes, and became an associate editor of the *Calcutta Journal of Natural History* He aided H B Fielding in the writing of *Sertum Plantarum* (1844), published *Travels in the Interior of Brazil* (1846), and many papers in the *London Journal of Botany* and other periodicals

GARDNER, Henry Brayton (1863–). An American political economist and educator, born in Providence, R I He graduated in 1884 at Brown University, studied at Johns Hopkins University, and in 1898 was appointed professor of political economy at Brown In 1897–98 he was vice president of the American Economic Association, and in 1912 became a vice president of the American Statistical Association His publications include *Statistics of Municipal Finance* (1889, in new series, No 2, of the American Statistical Association's publications), and a second monograph under the same title in new series, No 2 (1899), of the publications of the American Economic Association

GARDNER, Percy (1846–). An English classical archæologist, born at Hackney and educated at the City of London School and at Christ's College, Cambridge He was professor of archæology at Cambridge (1880–87); and thereafter professor of classical archæology at Oxford Professor Gardner is best known for his publications on ancient numismatics. Among his works are: *Types of Greek Coins* (1883), with Imhof-Blumer, "A Numismatic Commentary on Pausanias," in *Journal of Hellenic Studies*, vi–viii (1885–87), *New Chapters in Greek History* (1892), with Jevons, a *Manual of Greek Antiquities* (1895, 2d ed, 1898), *Sculptured Tombs of Hellas* (1896), *An Historic View of the New Testament* (1901), *A Grammar of Greek Art* (1905), *Growth of Christianity* (1907), *The Principles of Greek Art* (1914)

GARDNER GUN A machine gun consisting of one, two, or five simple breech-loading rifle barrels, placed parallel, about 1 4 inches apart, in a case or compartment The barrels are loaded, fired, and relieved of shells by one revolution of the hand crank These guns, of 45-inch calibre, are no longer used in the United States service, but have been replaced by the *automatic machine rifle*, calibre 30, a single-barrel, portable gun, capable of great rapidity of fire The inventor of the Gardner gun was Captain Gardner of the United States army See Machine Gun

GARDONE-RIVIERA, gär-dō'nā rē'vē-ā'rä A winter resort consisting of eight villages on the west shore of Lake Garda (q v), in north Italy It is sheltered by the mountains from all raw winds, and, in winter, has little rain, much sunshine, and an even temperature Beautiful villas have been built along its lake promenades and mountain gorges since 1885, when it became popular with Austrians and Germans It is now visited by invalids and tourists from all parts of the world Pop (commune), 1901, 1987, 1911, 2230

GARDTHAUSEN, gardt-hou'zen, Victor (Emil) (1843–) A German historian and paleographer He was born in Copenhagen, was educated at the universities of Kiel and Bonn, and at the University of Leipzig was librarian for many years (down to 1907) and, after 1877, professor of ancient history He published *Collectanea Ammianea* (1869), *Die geographische Quellen Ammians* (1873), and an edition of Ammianus Marcellinus (1875), standard works on this author until the publication of Clark's edition (1910), the important *Augustus und seine Zeit* (2 vols, 1891–1904), and a valuable *Griechische Palaographie* (1879, 2d ed, 1911–13)

GAREFOWL, or **GAIRFOWL,** gâr'foul' (Icel *geirfugl*, Swed *garfogel*, Dan *geirfugl*, Eng *gerfalcon*, connected with OHG *gīr*, Ger *Geier*, vulture, OHG *ger*, *gīri*, greedy + *fugl*, AS *fugol*, Ger *Vogel*, fowl) The great auk (*Plautus impennis*) once frequently seen in the Hebrides, but now extinct It was the largest of its race, standing about 29 inches high, and resembling a big razorbill It was black above and white beneath in winter, the head changing to snuff brown in summer Its small wings were useless for flying, and it waddled about with great difficulty on land Its defenselessness and stupidity made it easy to kill, even with clubs, and at first it was slaughtered and its rookeries robbed of eggs for food or amusement Later the demand for its feathers caused its rapid destruction, and the last bird was killed about 1844 See Auk

GA'RETH, Sir The youngest son of King Lot and Morgaine in the Arthurian legends He entered the court of his uncle, King Arthur, concealing his identity at the request of his mother, and received from Sir Kay the nickname Beaumains At the expiration of a year he received knighthood and, at the request of Linet, liberated her sister Liones, who was imprisoned

in Castle Perilous, and whom he afterward wedded Tennyson's "Gareth and Lynette" has some variations

GARFIELD A borough in Bergen Co, N J, 10 miles northwest of New York City, on the Erie Railroad and on the Passaic River, opposite Passaic It has woolen mills, knitting mills, embroidery works, stone works, a machine shop, and manufactures of clothing, wax paper, perfumes, chemicals, rubber goods, cigars, jewelry cases, paper boxes, etc Incorporated in 1898, it is governed by a mayor and a unicameral council The water works are owned by the borough Pop, 1900, 3504, 1910, 10,213; 1914 (U S est), 13,071, 1920, 19 381

GARFIELD, HARRY AUGUSTUS (1863–1917). An American college president, son of James A. Garfield He was born at Hiram, Portage Co, Ohio. Graduating from Williams College in 1885, he taught at Concord, N H, in 1885–86, practiced law at Cleveland, Ohio, from 1888 to 1903, was professor of contracts at the Western Reserve University Law School in 1891–97, and served as professor of politics at Princeton University from 1903 to 1908. In the latter year he was chosen president of Williams In 1896 he organized and later he was president of the Cleveland Municipal Association, and he was also president of the Cleveland Chamber of Commerce in 1898–99

GARFIELD, JAMES ABRAM (1831–81). Twentieth President of the United States. He was born in a log cabin at Orange, Cuyahoga Co, Ohio, Nov 19, 1831, was left fatherless when two years of age, and his youth was spent in alternate periods of study at school and hard manual work for his own support He worked on a farm until his seventeenth year, when he left home and was engaged to drive horses and mules on the towpath of the Ohio Canal, later he was engaged as a deck hand Returning home, he entered the Geauga Seminary at Chester, Ohio, in his eighteenth year, and began the study of Latin, Greek, and algebra In 1851 he entered the Western Reserve Eclectic Institute (now Hiram College) at Hiram, Ohio, and in 1854 entered Williams College, Mass, where he graduated with high honor in 1856 The same year he became teacher of Latin and Greek in the institute at Hiram, Ohio, and a year later he was elected president of that institution Before entering college, he had united with the Disciples Church, in which he had been brought up, and, according to the usage of that denomination, though never formally ordained to the ministry, he often preached In 1858 he entered his name as a student with a law firm in Cleveland, Ohio, and, though his study was carried on by himself at Hiram, he was admitted to the bar in 1861 Having taken some part as a Republican in the campaign of 1856, he was in 1859 elected to represent the counties of Portage and Summit in the State Senate In August, 1861, he was appointed lieutenant colonel of volunteers, and in September colonel. In December he reported for duty to General Buell at Louisville, Ky, and was ordered in command of a brigade of four regiments of infantry, to repel the Confederates under General Marshall from the valley of the Big Sandy River. He accomplished the task in January, 1862, defeating Marshall in the battle of Middle Creek, and forcing him to retreat from the State He was commissioned brigadier general, was placed in command of the Twentieth Brigade, and was ordered to join General Buell He reached, with his brigade, the field of Shiloh on the second day of the battle, and aided in the final repulse of the enemy, and next day, at the front with Sherman, took part in the attack on the enemy's rear guard He participated in the siege of Corinth, and, after its evacuation, was detailed to rebuild the railroad to Decatur In October, 1862, he served on a court of inquiry, and in November on the court-martial which tried General Fitz John Porter In February, 1863, he joined the Army of the Cumberland under Rosecrans, just after the battle of Stone River, and was appointed chief of staff In the discussion with regard to a forward movement, Garfield, as chief of staff, collated the written opinions of the seventeen corps, division, and cavalry generals, and summarized their substance with cogent arguments of his own This report induced Rosecrans to move forward, contrary to the opinions of most of his generals, in the Tullahoma campaign, opening the way for the advance on Chattanooga In the battle of Chickamauga, September 19 and 20, Garfield issued the orders, as chief of staff, and after the retreat of the right of the army rode under fire across country and took word to Thomas, commanding the left wing, of the necessities of the situation, and, under Thomas, assisted in retrieving the disaster Garfield was sent to Washington with dispatches, and was promoted to the rank of major general for his heroism and splendid services in the battle

Having been elected a Representative in Congress, he yielded to the solicitation of Lincoln, resigned his commission Dec 5, 1863, and took his seat in the House of Representatives, where he joined the radical wing of the Republican party and served as member of the Military Committee until the close of the war Largely through his efforts and arguments, the commutation clause of the Enrollment Act was repealed, and the draft enforced at a time when otherwise the army would have been fatally depleted He was in New York studying the subject of finance when the news of Lincoln's assassination was received, and he stilled an excited and angry crowd in Wall Street with the memorable words "Fellow Citizens, God reigns, and the government at Washington still lives!" On March 16, 1866, as a member of the Committee of Ways and Means, he made an elaborate speech on the public debt and specie payments In 1867–68, as also later, he took strong ground against the improper inflation of the currency In December, 1867, he returned to the Military Committee as chairman, and held that place during the discussions on the reconstruction of the Southern States, delivering a speech Jan 17, 1868, on the power of Congress in this relation, in which he severely criticized the action of the President, and the course of Major General Hancock in his celebrated "Order No 40" He also sustained the motion to impeach the President Later he was chairman of the Committee on Banking and Currency, and of a special committee to investigate the cause of the gold panic in September, 1869, which culminated in the crisis of "Black Friday" He also drafted a bill for the taking of the census of 1870, which was rejected by Congress, but was made the basis of the law passed ten years later for the census of 1880 In 1871–75 he served as chairman of the Committee on Appropriations, and in this capacity introduced

many important reforms In 1873 charges of corruption were made against him in relation to the Crédit Mobilier (q v) These attracted attention throughout the country, and especially in his own congressional district After earnest discussion he was renominated by the three-fourths vote of the convention, and was reelected by a large majority. The charges were renewed two years later, but were met with greater strength In 1876 there was no opposition in the convention, and in 1878 he was reelected by a large majority In the Forty-fourth Congress (1875–77) the Democratic party was in the majority Garfield became a member of the Committee of Ways and Means He was a frequent and careful speaker on important measures, and was recognized as one of the leaders of the minority After the presidential election of 1876, he was one of the prominent Republicans requested to witness the counting of votes in Louisiana, and one of two Republican members appointed by the House of Representatives to sit in the Electoral Commission (q v) In December, 1876, he was nominated by his party for Speaker of the House of Representatives, and received the same nomination on two subsequent occasions In the Forty-fifth Congress (1877–79) he earnestly advocated the resumption of specie payments, and spoke against the Bland Silver Bill In January, 1880, he was elected by the Ohio Legislature to the United States Senate

In the Republican National Convention at Chicago, June, 1880, he was an earnest advocate of the nomination of John Sherman of Ohio The convention was divided between the advocates of General Grant and the opposition favoring James G Blaine, John Sherman, and others. Garfield was not at first considered a candidate, but after more than thirty ballots without a choice, and earnest discussion in which, as well as in the advocacy of his favorite candidate, he won the admiration of delegates from all sections, he received the nomination In November he received 214 electoral votes as against 155 for his opponent on the Democratic ticket, Gen Winfield S Hancock, and was inaugurated on March 4, 1881 With the single exception of Robert T Lincoln, Secretary of War, his cabinet, headed by James G Blaine, as Secretary of State, was drawn from that wing of the Republican party of which Garfield himself was a member, and which antagonized the so-called "Stalwarts" (q v), among whom the Vice President, Arthur, ranked himself. Both in public and in private, however, Garfield had signified his earnest desire to unite all factions in support of his administration, and the people in general were disposed to trust in his promises On March 23 the President sent in the name of William H Robertson as his appointee to the office of collector of the port of New York As Mr Robertson was known to be a political enemy of Senator Conkling, the leading spirit among the "Stalwarts," Conkling looked upon the nomination as an affront to himself, and when he found that he could not prevent the Senate from confirming it, he and his colleague, Thomas C Platt, resigned their offices (May 16) and returned to New York to seek vindication by reelection The New York Legislature, however, refused to reelect either one, and after a long and tedious struggle Messrs Lapham and Warner Miller were chosen in their stead Meanwhile the President's nomination had been confirmed in the Senate, and the breach between the Stalwarts and the administration was hopelessly widened On July 2 Charles J Guiteau, a man whose vanity had been offended by the refusal of an office, and whose unbalanced brain had been excited by the dissensions in the Republican party, shot Garfield in the railway station at Washington The crime excited the horror and execration of all parties alike, and foreign nations joined in the universal sorrow and indignation For eighty days Garfield lingered between life and death Towards the end of August his medical attendants felt that his last chance of recovery depended on his removal from the malarious climate of Washington, and on September 6 he was taken by train to Elberon, N J, where he died thirteen days later, on the 19th The assassin Guiteau was convicted after a protracted trial in which the only defense offered was that of insanity, and was hanged in the jail at Washington on June 30, 1882

There is no satisfactory biography of Garfield His writings were collected and edited by B A. Hinsdale (Boston, 1882) There are numerous accounts of his life which were written for campaign purposes or immediately after his death, among them Conwell, *Life, Speeches, and Public Services of Gen James A Garfield* (Boston, 1880), Green, *A Royal Life, or the Eventful History of James A Garfield* (Chicago, 1882), Lossing, *A Biography of James A Garfield* (New York, 1882), Ridpath, *The Life and Work of James A Garfield* (Cincinnati, 1882) Consult also Pedder, *Garfield's Place in History* (New York, 1882), Hinsdale, *President Garfield and Education* (Boston, 1882), Stoddard, *Hayes Garfield and Arthur* (New York, 1889) Dodge, *Biography of James G Blaine* (New York, 1895), is valuable for its Garfield-Blaine correspondence.

GARFIELD, James Rudolph (1865–). An American lawyer and government official, the son of President Garfield He was born at Hiram, Ohio, graduated at Williams College in 1885, and after studying law at the Columbia Law School was admitted to the bar in 1888 He served in the Upper House of the Ohio Legislature in 1896–99, and in 1903 became Commissioner of the Bureau of Corporations in the Federal Department of Commerce and Labor. During 1905 and 1906 he investigated the methods of the western beef packers and of the Standard Oil Company President Roosevelt appointed him Secretary of the Interior in 1907, and before his retirement in 1909 he had completely reorganized the department He was especially active in the land-office reforms He took a prominent part in the organization of the Progressive party in 1912

GARFIELD MONUMENT A monument at Cleveland, Ohio, in memory of the martyred President, dedicated May 30, 1890 Its cost, $135,000, was defrayed by popular subscription The monument is a round tower, 50 feet in diameter and 148 feet high, containing a marble statue of Garfield

GARFISH. See Gar

GAR'GANEY. A European teal duck (*Querquedula circia* or *Anas querquedula*) resembling the American blue-winged teal (see Teal), which never ranges far north of central Europe, but is known eastward to China It is also called "summer teal"

GARGANO, gar-ga'nō (Lat *Garganus*). A peninsula on the east coast of south Italy ex-

tending into the Adriatic, containing both Monte Gargano and Monte Sant' Angelo (Map Italy, C 2), separated from the rest of the Apennines by the broad valley of the Candelaio Although now quite treeless, it was renowned for its oaks during Roman times It is 54 miles long, 27 miles broad, and in Mount Calvo rises to the height of 3465 feet

GARGAN'TUA, *Fr pron* gar'gaN'tu'a' A leading character in Rabelais's satire, *The Grand and Inestimable Chronicles of the Grand and Enormous Giant Gargantua* (1531) He appears also in another *Gargantua* (1535), the first part of the work now known as *Gargantua and Pantagruel* (1532–64) See RABELAIS

GARGA'PHIA The name of a valley near Platæa in Greece, the place where Actæon (q v) was torn to pieces by his own hounds (Ovid, *Met*, iii, 156)

GAR'GARA, or **GAR'GARUS** See IDA

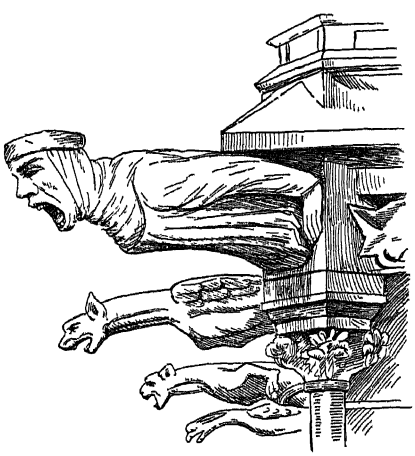
GAR'GERY, JOE A simple, open-hearted blacksmith, in Dickens's *Great Expectations*

GARGET, gar'gĕt See MAMMITIS

GARGET ROOT. See PHYTOLACCA

GARGLE, or **GAR'GARISM** (OF *gargouille*, throat, from Lat *gurgulio*, gullet) One of a group of medicines intended to be ejected from the mouth after having been churned about in the back part of the mouth and throat, to cleanse parts affected with discharges from ulcers, or to act as astringents (q v) or stimulants (q v) in sore throat The best gargles are composed of boric acid solution, or alcohol and water, of chlorine water or solution of permanganate of potash, in putrescent cases, of alum or capsicum, when a stimulating effect is required, of tannin or oak-bark decoction with alum or borax, in case a pure astringent is needed Gargles should never contain any drug that would act as a poison if swallowed, nor substances that would injure the teeth

GAR'GOYLE (OF *gargoille, gargouille*, Fr *gargouille*, throat, connected with Lat *gurgulio*, throat). A projecting spout, discharging the



GARGOYLES
Decorating the sacristy of the cathedral of Notre Dame at Paris

water from the roof gutters of buildings Gargoyles of various forms have been used in almost all styles of architecture Early examples are found in the temples of Edfu and Denderah in Egypt. The name is sometimes applied to the gutter outlets of Greek and Etruscan temples carved in marble or terra cotta into the form of lions' or other heads or grotesque faces But it is more commonly understood to designate the long and grotesquely carved spouts characteristic of Gothic architecture, with heads of men, beasts, or birds in preposterous combinations with bodies, wings, and paws of monsters Some of them are famous, notably those of Notre Dame in Paris In late castellated buildings they frequently assume the form of small cannons projecting from the parapet In modern times the use of metal pipes to convey the water from roofs has almost entirely superseded the use of gargoyles

GARIBALDI (so called from its color, red having been worn by adherents of Garibaldi) A name in California for the red perch (*Hypsypops rubicunda*)

GARIBALDI, ga'rē-bal'dē, GIUSEPPE (1807–82) An Italian patriot and liberator, born at Nice, July 4, 1807 He was a sailor's son and adopted the sea as his own calling and as early as 1830 was in command of a brig It was about this time that he became interested in the Italian national movement, which afterward became the great passion of his life He made the acquaintance of Mazzini and other leaders of Young Italy in 1833 and became imbued with an unquenchable hatred of despotism He was compromised by his participation in the futile outbreak at Genoa in 1834 and fled to French territory, while his condemnation to death was published in Italy He resumed his seafaring life and sailed to South America, where he took an active part in the struggle of the new Republic of Uruguay, against the Argentine Dictator, Manuel Rosas He distinguished himself as an intrepid partisan leader on sea and land and contracted a romantic marriage with Anita, the remarkable woman who for several years shared his campaigns Upon receiving news of the rising of northern Italy against Austria in 1848, Garibaldi hastened to Europe to share in the struggles of his countrymen He bore an effective part in the whole of the Sardinian campaign as the commander of a volunteer corps He then joined the revolutionary government at Rome and distinguished himself by his defense of the city against the French forces under Oudinot in June and July, 1849 After a retreat of unparalleled difficulty through districts occupied by Austrian forces, Garibaldi, accompanied by his heroic wife, set sail in a small fishing craft towards Venice, but being pursued by Austrian vessels, they were compelled to land where they could, and, not far from the shore, his wife, exhausted by the dangers and terrible exertions of their flight, expired in the arms of her husband Garibaldi at length reached Genoa in safety and thence embarked for Tunis He afterward lived on Staten Island, N Y, supporting himself by making candles in a factory, revisited South America, and commanded an American trading-vessel on the Pacific coast

Returning to Europe in 1854, Garibaldi accepted the Sardinian monarchy as the hope of Italy, in the years preceding the War of 1859 As the head of an irregular auxiliary force of the Piedmontese army on the commencement of hostilities in 1859, his services were brilliant and effective, notwithstanding the limited scope assigned for his operations In 1860 he undertook the most momentous enterprise of his career After the disappointing

Peace of Villafranca had defeated the hope of liberation from the Austrian yoke just when it seemed to be approaching realization, the Italian people resumed the revolutionary operations which had been temporarily suspended in the hope that Italian unity would be accomplished through the efforts of Sardinia In Sicily, early in 1860, disturbances broke out, and Francesco Crispi (q v) obtained from Garibaldi a promise of assistance In fulfillment of this promise Garibaldi assembled at Genoa a volunteer force of 1070 patriots, and on May 5 set sail for the island of Sicily On the 11th his two small transport steamers reached Marsala in safety, and the landing of his followers was successfully effected in sight and partially under the fire of the Neapolitan fleet On the 15th, in the battle of Calatafimi, 3600 Neapolitan troops were routed by Garibaldi's small force, and this opening victory cleared the way to Palermo On the 27th of the same month Garibaldi and his little army occupied the heights which commanded Palermo, and after a desperate conflict with the Royalist troops fought their way into the city, which for several subsequent days had to sustain a ruthless bombardment from the united fire of the Neapolitan garrison and fleet The intervention of the British fleet, however, and the isolated and destitute condition of the garrison shut up in the forts, induced the Neapolitan general to capitulate (June 6), and on his departure with his troops Garibaldi remained in undisputed possession of the city and strongholds of Palermo He issued a proclamation as Dictator in the name of Italy and Victor Emmanuel, armed the citizens, and on July 20, at the head of 2500 men, he gave battle at Milazzo to 7000 Neapolitans, who were completely defeated and compelled to evacuate that fortress On the 25th the Neapolitans were driven back into Messina, into which Garibaldi made his triumphal entry on the 27th

On August 19 Garibaldi crossed over into Calabria and was immediately joined by large bodies of volunteers from all directions, by whom he was accompanied on his memorable and eventful march to Naples On September 5 his army, which then amounted to 25,000 or 30,000 men, occupied Salerno on the withdrawal of the Royalists, and on the 7th, amid the frenzied enthusiasm of the inhabitants, Garibaldi entered Naples, with only one or two friends, to prove to Europe that his advent was that of a welcome liberator and not of a conqueror On the previous day the capital had sullenly witnessed the withdrawal of the King, Francis II, to the fortress of Gaeta On the 1st of October the Royalist troops, numbering 15,000 men, advanced from Capua and attacked the whole line of Garibaldians spread along the Volturno Finally the Royalists were driven back to Capua in disorder Victor Emmanuel, at the head of the Sardinian army, now crossed the papal frontier, routed the troops under Lamoricière, and passed on into the Kingdom of Naples, where Garibaldi relinquished into his sovereign's hands the unconditional disposal of his army and absolute sway over the Neapolitan provinces Francis II was now besieged by the Sardinian forces in his stronghold of Gaeta, where on Feb 13, 1861, he was compelled to surrender to Victor Emmanuel. Garibaldi retired to Caprera, but in June, 1862, he raised a force of volunteers at Palermo, invaded Calabria, and marched upon Rome, which he believed must be wrested from the Pope before the unity of Italy could be accomplished Victor Emmanuel, fearing that Garibaldi's attempt on Rome would bring about foreign intervention with disastrous consequences to Italy, dispatched an army to check his progress Garibaldi was defeated by the Italian troops at Aspromonte (August 29) and taken prisoner, but was pardoned in October

During the campaign of 1866 Garibaldi took the field and was engaged in operations against the Austrians in the Tirol The year 1867 was disastrous for him Impatient of the long delays in completing the unification of Italy and bitterly opposed to the papal power, he organized an open invasion of the Papal States, which the Italian government could not countenance. France came to the aid of the Pope, the Garibaldians were defeated at Mentana (November 3), and their leader was made a prisoner, but was afterward allowed to return to Caprera, in the neighborhood of which a man-of-war was stationed to prevent his escape He left Caprera to fight for the French Republic in 1870 and was nominated to the command of the irregular forces in the region of Burgundy In 1871 he was returned a deputy to the French National Assembly which met at Bordeaux, but encountered such bitter criticism of his conduct during the war that he returned to Caprera He entered the Italian Parliament in 1874 After much hesitation he accepted from the Parliament an annual pension of 10,000 lire In 1860 Garibaldi was inveigled into an unhappy marriage with the Countess Raimondi, which was annulled in 1879, when he married Francesca, a peasant, who had been in his family's household for many years He died at Caprera, June 2, 1882 Garibaldi's novels, *Clelia* and *Cantoni il volontario*, have little literary value Of his two sons by his first wife the elder one, Menotti (1845–1903), fought with credit by his father's side, the younger, Ricciotti (1847–), was for some time deputy

Bibliography The first work in importance is naturally Garibaldi's own *Memoirs*, translated into English by Werner, and published under the title, *Autobiography of Giuseppe Garibaldi* (London, 1889) This authorized edition contains a supplement by Jessie White Mario and embodies all that Garibaldi wished to have published Much is omitted which Garibaldi preferred not to discuss, and there are many minor errors, as the memoirs were written entirely from memory, without verification of dates and other facts The volumes are, nevertheless, of great value Dwight, *Life of General Garibaldi, Translated from his Private Papers* (New York, new ed, 1903), is also autobiographical Consult also Bent, *The Life of Giuseppe Garibaldi* (London, 1881), G Guerzoni, *Garibaldi* (2 vols, Florence, 1882), Marriott, *The Makers of Modern Italy* (New York, 1889), which includes an Oxford lecture on Garibaldi, Stiavelli, *Garibaldi nella letteratura italiana* (Rome, 1901), F Bidischini, *Garibaldi nella vita intima* (ib, 1907), R Thurston, *Garibaldi and his Friends* (New York, 1907), Trevelyan, *Garibaldi's Defence of the Roman Republic* (ib, 1907), H N Gay, *Lincoln's Offer of a Command to Garibaldi* (ib, 1907), R S Holland, *Builders of Modern Italy* (ib, 1908); Trevelyan, *Garibaldi and the Thousand* (ib, 1909), A V Vecchi, *La vita e le geste di G Garibaldi* (Bologna, 1910), Trevelyan, *Garibaldi and*

GIUSEPPE GARIBALDI

the Making of Italy (New York, 1911). See ITALY

GARIEP' RIVER See ORANGE RIVER

GARIGLIANO, ga'rē-lya'nō (Lat *Liris*, earlier *Clanis*) A river of south Italy, 92 miles long, which rises in the Abruzzi as the Liri It receives the waters of the Sacco, the Melsa (at this point changing its name to Garigliano), and the Rapido, and then flows sluggishly through marshes, past the ruins of Minturnæ, into the Gulf of Gaeta, 10 miles east of Gaeta In the marshy swamps near the river Marius found concealment when pursued by Sulla On its banks in 1503 the Spaniards, under Cordova, won a famous victory over the French On Nov 3, 1860, the Neapolitan troops north of the river were defeated by the Sardinians, and as a result the investiture of Gaeta began

GARIGUE, ga'rēg' (Fr, uncultivated land, Cat *garriga*, from *garrig*, oak) A term applied to the barren and rocky desert-like areas of the Mediterranean region, where neither shrubs nor trees give tone to the landscape

GAR'LAND, AUGUSTUS HILL (1832–99) An American politician He was born in Tipton Co, Tenn, but when less than a year old was taken by his parents to Arkansas He was educated at St Mary's College, Lebanon, Ky, and at St Joseph's College, Bardstown, Ky, studied law, and was admitted to the Arkansas bar in 1853 He was a Whig, and opposed secession in the State Convention of 1861, but finally went with his State He was elected to the provisional Congress of the Confederate States in 1861; was elected to the House of the Confederate Congress in 1862, and afterward was a member of the Confederate Senate until the close of the war He then practiced law in Little Rock and carried to the Federal Supreme Court a case in which he got a decision against the "ironclad" oath that prevented those who had been in the service of the Confederacy from practicing in United States courts In 1866 he was elected to the United States Senate, but was not seated In the Brooks-Baxter "war" for the governorship of Arkansas, Garland aided Baxter In 1874–77 he was Governor of Arkansas under the new constitution He was a member of the United States Senate from 1877 to 1885 and in 1885–89 was Attorney-General of the United States in the cabinet of President Cleveland From 1889 to 1899 he practiced law in Washington, D C, and was stricken suddenly while pleading before the Supreme Court

GARLAND, HAMLIN (1860–). An American poet and story writer, born at La Crosse, Wis His youth was passed in various Western towns He completed his school education at Cedar Valley Seminary, Osage, Iowa, in 1881, farmed and taught in Illinois and Dakota, went to Boston in 1884, and devoted himself to literature there till 1891, since when he has lived chiefly in the West His first book was *Main-Traveled Roads* (1890), frankly realistic fiction Somewhat similar in character are *A Spoil of Office* (1892), *Prairie Folks* (1893), *A Little Norsk* (1891), *Rose of Dutcher's Coolly* (1895) Other novels are *Jason Edwards* (1891), *A Member of the Third House* (1892), *Wayside Courtships* (1897), *Her Mountain Lover* (1901) He has also written a volume of criticism entitled *Crumbling Idols* (1894), *Prairie Songs* (1894), a volume of verse, *Ulysses Grant · His Life and Character* (1898), *The Eagle's Heart* (1900); *The Captain of the Gray Horse Troop* (1902), *Hesper* (1903); *The Light of the Star* (1904), *The Tyranny of the Dark* (1905), *Victor Olnee's Discipline* (1911), *Forester's Daughter* (1914) He became known for realistic work chiefly interesting for its local color

GARLAND, LANDON CABELL (1810–95) An American educator, born in Nelson Co, Va He graduated in 1829 at Hampden-Sidney College (Va), in 1834 accepted the chair of physics in Randolph-Macon College (Va), and from 1835 to 1847 was president of that institution In 1847–53 he was professor of mathematics and astronomy in the University of Alabama, of which he was president from 1855 to 1866, after serving for two years as president of the Northeastern Southwestern Railroad, from 1866 to 1875 he was professor of physics and astronomy in the University of Mississippi, and in 1875 he became chancellor and professor of physics in Vanderbilt University He resigned from the chancellorship in 1893 He published *Trigonometry, Plane and Spherical* (1841), one of a projected series of textbooks, the remaining manuscripts of which were destroyed by fire

GAR'LIC (AS *gārlēac*, from *gār*, spear + *lēac*, leek, so called from the shape of the leaves), *Allium sativum* A bulbous-rooted plant, native of the East, cultivated from the earliest ages The stem rises to the height of about 2 feet, is unbranched, and bears at the top an umbel of a few whitish flowers, mixed with many small bulbs The leaves are grasslike, obscurely keeled, and not fistulous like those of the onion The bulb, which is the part eaten, consists of about 12 to 15 ovate-oblong cloves or subordinate bulbs It has a penetrating and powerful onion-like odor and taste It is in general use as a condiment with other articles of food in southern Europe, but has only a limited use in the United States Garlic, or its fresh juice, is also used in medicine It owes its properties chiefly to oil of garlic The cultivation of garlic is extremely easy, it is generally propagated by its cloves Many species of the genus *Allium* are popularly called garlic, with some distinctive addition *Allium oleraceum* is sometimes called wild garlic in England, and its young and tender leaves are used as a potherb Its leaves are semicylindrical, and grooved on the upper side, and its stamens are all simple In America wild garlic is *Allium vineale*, a perennial also known as field garlic and wild onion This is a serious weed pest in pastures, hay and grain fields of the eastern United States from New York to South Carolina When eaten by cattle, it imparts a very disagreeable odor and flavor to the milk, butter, cheese, and other dairy products The species has hollow, thread-like leaves surrounding a slender scape, which bears an umbel of greenish-white or rose-colored flowers in midsummer, which are followed in early autumn by either seeds or bulblets The easiest way to eradicate it in fields is to alternate heavy cropping with clean cultivation See ALLIUM, ALLIACEOUS PLANT, Plate of ONIONS, ETC

GARLIC, OIL OF When cloves of garlic are distilled with water, about 0 2 per cent of a brown heavy oil, with an acrid taste and a strong disagreeable smell, passes over By careful rectification from a salt-water bath, about two-thirds of the oil may be obtained in the form of a yellow liquid, which is lighter than water, and which, when treated with fused calcium chloride (in order to dry it), and subse-

quently distilled from fragments of potassium, passes over pure and colorless as allyl sulphide, an organic compound of very considerable interest, whose formula is $(C_3H_5)_2S$ The crude oil also contains a compound of allyl still richer in sulphur than the sulphide Sulphide of allyl exists not only in oil of garlic, but also in the oils of onions, leeks, cress, alliaria, radishes, asafœtida, etc. It is a light, clear, pale-yellow oil, with a penetrating odor of garlic, it boils at 140° C and dissolves readily in alcohol and ether

GAR'MAN, SAMUEL (1846–) An American zoologist, born in Indiana Co, Pa He graduated in 1870 at the Illinois State Normal University, was principal of the Mississippi State Normal School in 1870–71, was a pupil of Louis Agassiz in special work in natural history (1872–73), and received appointment as assistant in the departments of herpetology and ichthyology at the Museum of Comparative Zoology, Cambridge His writings include *Fishes and Reptiles from Lake Titicaca* (*Bulletin* of the Museum, vol. iii, 1871–76, No 11); (joint author) *Exploration of Lake Titicaca* (ib, vol iii, 1871–76, Nos 11, 12, 15, and 16), *On Certain Species of Cheloniodæ* (ib, vol vi, 1879–80, No 6), *New Specimens of Selachians in the Museum Collection* (ib, vol vi, 1879–80, No 11), *The Reptiles and Batrachians of North America* (*Memoirs* of the Museum, vol viii, 1883, No 3), *Reptiles and Batrachians of the West Indies* (1887, printed in the *Bulletin* of the Essex Institute and in monograph form), *Deep Sea Fishes* (1899)

GARNEAU, gar'nō', ALFRED (1836–1904). A Canadian poet He was born in Quebec and was educated at the Quebec Seminary, after which he engaged in journalism. He later studied law and was called to the Lower Canada bar in 1860, but entered the civil service in 1861 and in 1873 was appointed chief French translator to the Dominion Senate. He wrote poems and sonnets distinguished by beauty of form and delicate feeling, they were collected and published in a volume two years after his death at Montreal In 1882 he published a fourth edition of the *Histoire du Canada*, by his father, François Xavier Garneau (q v) He also published *Les seigneurs de Frontenac* (1866) He thrice declined election to the Royal Society of Canada—His son, HECTOR GARNEAU (1872–), born in Ottawa, studied law and was admitted to the bar, but left the legal profession for literature and journalism, contributed weekly *chroniques* to *Le Monde*, literary criticisms to *Les Nouvelles*, and published *Poésies d'Alfred Garneau* (1906), the collected poems and sonnets of his father

GARNEAU, FRANÇOIS XAVIER (1809–66) A Canadian historian, born in Quebec He was educated at the Quebec Seminary and was admitted in 1830 as a notary In 1831 he visited France and England, and while in London the brilliant literary society into which he was admitted strongly influenced his aspirations to authorship. In 1833 he returned to Lower Canada, was appointed translator to the Legislative Assembly of that province, and from 1844 to 1864 was secretary of the city of Quebec He published an *Histoire du Canada, depuis sa découverte* (1845–48; 2d ed, revised and corrected, 1852, 3d ed, 1859), of which an unsatisfactory English translation by A Bell appeared at Montreal in 1860 (2d ed., 1862). He also wrote *Voyage en Angleterre et en France* (printed in the *Journal de Québec* in 1855) and contributed to periodicals numerous poems, collected in part in Huston's *Recueil de littérature canadienne* (Montreal, 1848) Garneau's history contains an account of all the French colonies of North America from their origin to the Treaty of 1763, and from the latter date the narrative is confined to Canada proper Notwithstanding the fact that Garneau had in part a controversial aim, his history remains a standard work In October, 1912, a monument to Garneau, by the French sculptor Chevré, was unveiled in Quebec Consult Casgrain, *Biographie de F X Garneau* (Montreal, 1886) See CANADIAN LITERATURE

GAR'NER, JAMES WILFORD (1871–) An American professor of political science, born in Pike Co, Miss He graduated from the Mississippi Agricultural and Mechanical College in 1892 and studied at the University of Chicago (Ph M, 1900) and at Columbia University (Ph D, 1902), where he was a lecturer in history in 1902–03 He was an instructor in political science at the University of Pennsylvania in 1903–04 and afterward professor of the same subject at the University of Illinois He served as collaborator for the French *Revue Politique et Parlementaire*, contributed to the NEW INTERNATIONAL ENCYCLOPÆDIA, and was editor in chief of the *American Journal of Criminal Law and Criminology* in 1910–11 He is author of *Reconstruction in Mississippi* (1901), *The History of the United States*, with Henry Cabot Lodge (4 vols, 1906), *Introduction to Political Science* (1910), *Government in the United States, National, State, and Local* (1911, 3d ed, 1914)

GAR'NET (ME. *garnet, grenat*, from OF *grenat*, It *granato*, from ML *granatus*, garnet, either on account of its crimson color, from ML. *granata*, cochineal insect, supposed to be a seed or berry, or from Lat. *granatum*, pomegranate, as resembling in shape and color pomegranate seeds, in either case from Lat *granum*, grain). An orthosilicate of varying composition that crystallizes in the isometric system Some varieties of garnet are not quite so hard as quartz, others are considerably harder When crystallized, garnets have a vitreous to resinous lustre They occur in schists and slates, and in gneiss, granite, and limestone, and sometimes in lava and serpentine, being usually of secondary origin Garnets are divided by Dana into three groups, viz, aluminium garnets, iron garnets, and calcium-chromium garnets

The first group includes *grossularite*, or calcium-aluminium garnet, *pyrope*, or magnesium-aluminium garnet; *almandite*, or iron-aluminium garnet, and *spessartite*, or manganese-aluminium garnet Grossularite, sometimes called *essonite*, or *hessonite*, or *cinnamon stone*, varies in color from white to different shades of yellow and brown, and from pale green to emerald green Gem varieties of the green grossularite are obtained in Siberia, and the brown-colored ones, or cinnamon stones, are found in Ceylon, where they are sometimes miscalled *hyacinth*. In the United States green varieties have been found at Brewster, N Y, and red and yellow varieties in Phippsburg, Me, and Warren, N H, also at various places along the Alleghany Range A rose-red variety of grossularite, called *rose garnet*, from Xalostoc, Mexico, is used as an ornamental material when cut and polished. Pyrope,

which is called *precious* or *Oriental garnet*, is of a deep-red to black color The best-known varieties are found at a number of places in Bohemia, excellent specimens are also obtained at the Kimberley mines in South Africa In the United States the finest pyrope garnets come from Arizona, southern Colorado, and New Mexico, where they are often called *Arizona rubies*, while the varieties from South Africa are known as *Cape rubies* Almandite, which is the common garnet, varies in color from deep red to black The transparent scarlet and crimson varieties, when cut, are called *carbuncles*, these were highly prized by the ancients According to the Talmud, the only light that Noah had in the Ark was furnished by carbuncles The finest almandite garnets are from Siriam, India, from Burke, Caldwell, and Catawba counties, N C, and from Idaho The specimens found in the United States, although inferior to those from India, are generally of good enough quality to be used as watch jewels

Spessartite is of a dark hyacinth-red to brownish-red color, it is found in the Ural Mountains and in Amelia Co, Va

The second group comprises the garnets which have the general name of *andradite* They range in color from light yellow through various shades of green to red, brown, and black, and according to their colors they have special names, among which are *demantoid* for the green variety and *melanite* for the black variety They are found variously throughout the world, chiefly along mountain ranges

The last group is formed by *uvarovite*, or calcium-chromium garnet, which is of an emerald-green color, and is found in Siberia as well as at various localities in Canada

According to their transparency and richness of color, garnets are cut and used for gem purposes Among the ancients garnets—especially the precious varieties—were cut and polished into various ornaments Pliny describes a vessel formed from carbuncles, having the capacity of a pint A number of fine ancient specimens of engraving on garnets are to be found in the larger collections The common garnet is frequently ground and used for polishing and cutting other stones and also for the manufacture of sandpaper About 4000 tons of garnets for abrasive purposes—chiefly in the shoe industry—are produced annually in the United States from mines principally situated in New York Garnets of the gem variety have been made artificially in Paris by the fusion of their constituents See GEMS, LEUCITE

GARNET, or GARNETT, HENRY (1555–1606) An English Jesuit, educated at Winchester and in London He joined the Society of Jesus in 1575 and became a superior of the order in England in 1587 He is chiefly remembered for his connection with the Gunpowder Plot His participation in that conspiracy consisted of his concealment of knowledge of the intended crime, gained in the confessional—an offense punishable by life imprisonment and forfeiture of property He was, however, convicted on the charge of high treason instead of misprision of treason and was executed Considerable controversy resulted between Roman Catholic and Protestant writers, and disputes arose among Jesuits themselves as to Garnet's justification or blame in concealing the plot that had become known to him through the religious rite of the confession.

GAR'NET, HENRY HIGHLAND (1815–82). An Afro-American clergyman and orator, born a slave in New Market, Md He was a pure-blooded negro of the Mendigo tribe When he was 10 years old, his parents escaped from slavery and settled in New York City He was educated at Canaan Academy, New Hampshire, and graduated at Oneida Institute, near Utica, N Y, in 1840 He studied theology, and in 1842 became pastor of a Presbyterian church in Troy A leader of the Abolition movement, he published the *Clarion*, a weekly paper devoted to the cause and in 1850–53 lectured in Great Britain on slavery He was a delegate to the Peace Congress at Frankfort in 1851 and in 1853–55 was a missionary of the United Presbyterian Church of Scotland in Jamaica He was pastor of the Shiloh Presbyterian Church in New York City in 1855–81, except that in 1865–69 he had a charge in Washington, D C President Garfield appointed him Minister Resident and Consul General for the United States in Liberia, but Garnet died a few months after taking charge of his new post

GAR'NETT A city and the county seat of Anderson Co, Kans, 85 miles southwest of Kansas City, Mo, on the Missouri Pacific and the Atchison, Topeka, and Santa Fe railroads (Map Kansas, G 6) It is in the gas and oil region, has considerable trade in agricultural products, and manufactures furniture, flour, lumber, etc Garnett adopted the commission form of government in 1913 The water works are owned by the city Pop, 1900, 2078, 1910, 2334

GARNETT, JAMES MERCER (1840–1916) An American educator, born at Aldie, Va He graduated at the University of Virginia in 1859, served in the Confederate army and rose to be captain of artillery, and in 1867 was appointed professor of Greek in the Louisiana State University Subsequently he was instructor in ancient languages and mathematics at the Episcopal High School (near Alexandria, Va) From 1870 to 1880 he was president of St John's College (Annapolis, Md), and from 1882 to 1896 professor of English literature in the University of Virginia He was elected president in 1890 of the American Dialect Society and in 1893 of the American Philological Association He edited *Selections in English Prose* (1891) and published a *Translation of Beowulf* (1882, 6th ed, 1900), a literal version in metre resembling the original, *Elene and Other Anglo-Saxon Poems* (1889–1900), and a *History of the University of Virginia* (1901)

GARNETT, RICHARD (1835–1906) An English librarian and author, born in Lichfield He entered the service of the British Museum under Panizzi when he was 16 years old, became superintendent of the reading room in 1875, and from 1890 to 1899, when he retired, was keeper of printed books From 1881 until 1890 Dr Garnett had charge of the preparation and printing of the great catalogue of authors of the museum He acted as president of the Library Association of the United Kingdom and of the Bibliographical Society In his professional field he edited the series of manuals entitled the "Library Series," to which he contributed *Essays in Librarianship and Bibliography* (1899) He published several volumes of verse, including *Primula* (1858), *Io in Egypt* (1859), *Collected Poems* (1893), and *The Queen and Other Poems* (1901) To the "Great Writers Series"

he contributed lives of *Carlyle* (1887), *Emerson* (1888), and *Milton* (1890) Among his other works are *Relics of Shelley* (1862), *The Twilight of the Gods and Other Tales* (1888), *Age of Dryden* (1895), *A History of Italian Literature* (1898), *Essays of an ex-Librarian* (1901), *William Shakespeare, Pedagogue and Poacher* (1904) He was editor of the *International Library of Famous Literature*, and contributed to the *Dictionary of National Biography* and the *Encyclopædia Britannica* With Edmund Gosse he published in 1903–04 an *English Literature*, elaborately illustrated

GARNETT, ROBERT SELDEN (1819–61) An American soldier, born in Essex Co, Va He graduated at West Point in 1841, in 1841–42 was on duty on the northern frontier during the Canadian border troubles, was instructor in infantry tactics at West Point (1843–44), took part in the military occupation of Texas (1845–46), and fought through the Mexican War From 1846 to 1849 he was aid-de-camp to Major General Taylor and in 1847 was brevetted major for gallant and meritorious conduct at Buena Vista In 1852–54 he was commandant at West Point, in 1855 he became major, and in 1861, resigning from the United States army, he was appointed a brigadier general in the Army of the Confederate States In command of the forces in western Virginia, he fell back before the superior numbers under Major General McClellan, was pursued and overtaken at Carrick's Ford (q v), and was killed in the ensuing combat (July 13, 1861)

GARN'HAM, DR See GAYNHAM

GARNIER, gar'nyā', CLÉMENT JOSEPH (1813–82) A French economist He was born at Beuil (Alpes Maritimes), studied at the Ecole du Commerce, and was appointed professor of mathematics and political economy in that institution In 1842 he assisted in founding the French Society of Political Economy and in 1846 the French Free-Trade Association. From 1845 to 1855 and from 1866 until his death he was editor of the *Journal des Economistes* He wrote a number of works which did much to popularize economic science in France, and which include an *Introduction à l'étude de l'économie politique* (1843), *Richard Cobden, les ligueurs et la ligue* (1846), *Etude sur les profits et les salaires* (1848), *Traité des finances* (1862)

GARNIER, (MARIE JOSEPH) FRANÇOIS (1839–73), usually called Francis Garnier A French officer and explorer, born at Saint-Etienne He served under Admiral Charner in the war with China (1860–62), and remained in Cochin-China as a civil officer In 1866 he accompanied Captain Doudart de Lagrée's exploring expedition from the coast of Cambodia through Yunnan to Shanghai On the death of the commander Garnier successfully brought the expedition along the Yang-tse-kiang to the coast A remarkable account of the expedition is given in his *Voyage d'exploration en Indo-Chine* (1873) After taking part in the defense of Paris in 1870–71, which he described in his journal *Le siège de Paris* (1871), he again went to the East Further explorations were followed by a commission from the Governor of Cochin-China to negotiate a treaty with the Viceroy of Tongking The Viceroy, however, refused to negotiate, and Garnier, with 120 men, took Hanoi, the capital, and won further successes, but reenforcements were delayed, the party fell into an ambuscade, and Garnier was killed Consult Yule *Ocean Highways* (1874), and Petit, *Francis Garnier* (Paris, 1885)

GARNIER, JEAN JACQUES (1729–1805) A French historian, born at Gorron (Mayenne) Having arrived at Paris on foot, he entered the Minorite Order and in 1760 became adjunct professor of Hebrew in the Collège de France, and in 1768 inspector there In 1761 his *Traité de l'origine du gouvernement français* was crowned by the Academy of Inscriptions, to which he was elected as associate He succeeded Claude Villaret as historiographer, and wrote a continuation (1765–85) of the *Histoire de France* of Velly and Villaret, an interesting work on *L'Homme de lettres* (1764), and a treatise, *De l'éducation civile* (1765)

GARNIER, JEAN LOUIS CHARLES (1825–98) A French architect, born in Paris He studied under Léveil and Lebas at the Ecole des Beaux-Arts, and won the Prix de Rome for architecture in 1848 Afterward he traveled extensively in Greece, Turkey, and Italy In 1859 he won the competitive prize for plans for the new Opera House in Paris, which was in process of building from 1861 to 1875 Although somewhat overornate in detail, this is a design of remarkable merit and has exercised a notable influence on French monumental façade composition Its staircase is especially magnificent, and its foyer (see FOYER) the largest and most sumptuous in the world Garnier also built the Conservatory at Nice, the Casino at Monte Carlo, designed the tombs of Offenbach, Bizet, and Victor Massé in Paris, and, with Debacq, built the De Luynes Mortuary Chapel at Dampierre He wrote *Restauration des tombeaux des rois Angevins en Italie* (with 54 plates in folio), *A travers les arts* (1869), *Etude sur le théâtre* (1871), *Le nouvel Opéra de Paris* (1875–81), *Monographie de l'observatoire de Nice* (1892), *Histoire de l'habitation humaine* (1894), with Ammann He was a member of every architectural society of importance in France and abroad, and in 1889 was made commander of the Legion of Honor

GARNIER, ROBERT (c.1534–c 90). A French dramatic poet, born at La Ferté-Bernard He studied law at Toulouse and held various positions under the state before he gave himself entirely to the writing of drama His plays have little real action, and that little is clogged by the long speeches and interminable dialogues of the characters Nevertheless, in his later works, when he was less under the influence of Seneca, there is a freshness and vigor that suggests Corneille, and he is the greatest French dramatic author of his century His works include *Porcie épouse de Brutus* (1568), a tragicomedy, and *Sédécie, ou les Juives* (1583) He wrote a volume of poems, *Les plaintes amoureuses* (1565), which is now lost His collected works were published in four volumes by Foerster at Heilbronn in 1882–83 Consult Bernage, *Etude sur Robert Garnier* (Paris, 1880), Mysing, *Robert Garnier und die antike Tragodie* (Leipzig, 1891), Faguet, *La tragédie française au XVIe siecle* (Paris, 1883)

GARNIER-PAGÈS, gar'nyā' pa'zhĕs', ETIENNE JOSEPH LOUIS (1801–41). A French politician, born in Marseilles He was admitted to the bar, took part in the revolution of 1830, in 1831 became member for Isère in the Chamber of Deputies, and in 1832 was one of the Liberals associated with Odilon Barrot in the prepara-

tion of the famous *Compte rendu*, in protest against the attitude of the Conservative Ministry He was not reelected in 1834, but was returned in 1835 and 1839

GARNIER-PAGÈS, Louis Antoine (1803–78) A French statesman, born in Marseilles He fought in the July revolution of 1830, was chosen to the Chamber of Deputies in 1841 to succeed his stepbrother, Etienne Joseph Louis, and took high rank as leader of the opposition and a promoter of reform agitation In February, 1848, he became a member of the provisional government and mayor of Paris, and in March, Minister of Finance Circumstances forced him to extreme measures, of which the most unpopular was the celebrated tax of "45 centimes" In May he was one of the executive committee of five appointed by the Assembly. In 1864 he was a member of the Corps Législatif, devoting himself as such especially to financial matters, and until the fall of the Empire had a part in the most important acts of the Republican opposition Having been reelected in 1869, he vigorously opposed war with Prussia, but, though a member of the Government of National Defense, he played an unimportant rôle, and retired to private life in 1871 He published *Histoire de la Révolution de 1848* (8 vols, 1860–62), *Histoire de la commission exécutive* (1869–72), *L'Opposition et l'empire* (1872).

GAR'NISHMENT (from *garnish*, from OF *garnir, guarnir, warnir*, Fr *garnir*, from OHG *warnōn*, Ger *Warnen*, AS *wearnian*, Eng *warn*) A process by which chattels, rights, or credits belonging to the defendant in an action, but which are in the possession of a third person, are seized and applied to the plaintiff's claim The peculiarity of the process is indicated by the etymology of the term, garnishment meaning a warning or notice given to the third person not to pay money or turn over property to the defendant It has been called an equitable attachment of the claims or assets of a defendant in the hands of a third person It is not a common-law process and is regulated by statute in the States where it exists Such statutes are, as a rule, strictly construed, and their requirements must be fully and fairly complied with by a plaintiff who would take advantage of them It is held that only such property in the hands of the third party—the garnishee—is liable to this process as is not incumbered with trusts, and such as may be handed over or paid by the officer executing the process, under the order of the court and free from incumbrances, which can be properly determined and adjusted only by equity tribunals Garnishment proceedings reach only such debts as are owing to the defendant at the time the process is served A judgment obtained in a Federal court cannot be garnisheed in an action in a State court Such garnishment would operate to oust the Federal court of its proper control over its own judgments Debts owing by a public corporation to the defendant are not garnishable If they were, municipal authorities might be compelled to occupy their time over contests in which the public had no interest. It may be laid down as a general rule that a person deriving his authority from the law to receive and hold property cannot be garnisheed for the same while holding it in that capacity.

As soon as the process of garnishment is duly served, the garnishee holds the property as a stakeholder or trustee Accordingly garnishment is known in some States as 'trustee process" Consult Rood, *Garnishment* (St Paul, 1896), and the authorities referred to under Attachment

GARN'SEY, Elmer Ellsworth (1862–) An American mural painter He was born at Holmdel, Monmouth Co, N J, and studied at Cooper Union in New York and under Maynard and Francis Lathrop He made an important part of his work the arranging of color schemes for important mural decorations Among the buildings to which he has thus contributed are the Library of Congress, the public libraries of Boston and St Louis, and the library of Columbia University, Memorial Hall, Yale University, the State capitols at St Paul, Minn, Des Moines, Iowa, and Madison, Wis, and the Custom House, New York He was elected a member of the Society of Mural Painters and of the American Institute of Architects and received awards from the World's Fair, Chicago (1893), and the Paris Exposition (1900)

GARO (ga'rō) or **GARROW HILLS.** Mountains overhanging the valley of the Brahmaputra, which give their name to a western district of the Hill Division of Assam (q v), 3350 square miles in area, and reach their highest altitude at 4650 feet The region has deep and extensive valleys, well watered and very fertile Dense forests containing valuable sál trees cover the hills, and coal is found in large quantities Pop (district), 1901, 138,300, 1910, 153,936 See Garos

GAROFALO, ga-rō'fa-lō, properly Benvenuto Tisio, or Tisi (c 1481–1559) A Ferrarese painter of the Renaissance He was born at Garofalo, near Ferrara, studied under Panetta at Ferrara and under Boccaccino at Cremona and in 1499 went to Rome, where he became the pupil of Giovanni Baldini After this he painted with Lorenzo Costa at Mantua From 1509 to 1515 he was in Ferrara with Dosso Dossi and then returned to Rome Here he was an ardent admirer of Raphael He was then recalled to Ferrara, where he executed for the Duke Alphonso I some of his best paintings and was active until 1550, especially in fresco work, which has since been destroyed For the last nine years of his life he was blind His art is especially well represented at Ferrara In the Museum are his "Massacre of the Innocents," "Resurrection of Lazarus" (1534), "Adoration of the Magi" (1544), and many other works, in the cathedral his "Virgin Enthroned" (1524) and fine frescoes of Saints Peter and Paul, and in San Francesco the "Kiss of Judas," with two fine portraits of donors His works are also numerous at Rome in several of the palaces (including Borghese and the Vatican) and in the museum of the Capitol, at Naples, and in the Brera (Milan) Outside of Italy the largest collection of his works is at Dresden, which possesses seven examples, including a Bacchanale, he is also represented in the galleries of Berlin, London, St Petersburg, and in the Metropolitan Museum, New York His finest works were executed in the manner of the Ferrarese school, to which he afterward added a certain suavity, gained probably from his admiration of Raphael His coloring is peculiarly vivid and attractive, often showing Venetian influence, and his pictures are most harmoniously composed.

GAROFALO, RAFFAELE, BARON (1852–) An Italian jurist and criminologist, born at Naples and educated in the university of that city He served as president of the Civil Court of Ferrara, as justice of the Court of Appeals of Naples. and as professor of law and criminal procedure at the University of Naples In 1892 he had charge of the preparatory work of editing a new code of penal procedure Besides serving as a collaborator on the *Flegrea*, he is author of *Criminologia studio sul delitto e sulla teoria della repressione* (1885, 2d ed, 1891, Eng trans by Robert Wyness Millar, 1914) and *Riforma della procedura penale in Italia* (1889)

GARON BUSH See DAPHNE

GARONNE, gä'rŏn' (Lat *Garumna*). The principal river in the southwestern part of France, rising within the Spanish frontier in the Val d'Aran, at the base of Mount Maladetta, in the Pyrenees (Map France, S, F 5) About 26 miles from its source it enters France in the Department of Haute-Garonne, flows in a generally northeasterly course to Toulouse, then bends to the northwest and enters the Bay of Biscay at Point de Grave It forms an estuary after uniting with the Dordogne, 20 miles below Bordeaux, which is called the Gironde Ocean steamers ascend to Bordeaux, and the river is navigable beyond Toulouse, which is connected with the Mediterranean by the Canal du Midi (q v) Total length, nearly 400 miles With its 32 tributaries the Garonne drains an area of about 38,000 square miles and forms a system of navigable waterways of over 1400 miles, which is greater than that of any other French river The Garonne is subject to destructive overflows During the inundation of 1875 more than 7000 houses were destroyed Consult L Barron, *Les fleuves de France La Garonne* (Paris, 1901)

GARONNE, HAUTE See HAUTE-GARONNE

GAROS, gä'rōz A people inhabiting the region of the Garo Hills in western Assam, India. They are said to be related, physically and linguistically, to the Thai (Burmese, Siamese, etc) stock, but have a considerable Aryan admixture, particularly in language They have many interesting social customs, among them courtship by the woman, bridegroom capture, etc Besides the article by Godwin-Austen on "The Garo Hill Tribes," in the *Journal of the Anthropological Institute* (London), for 1871, reference may be made to Dalton, *Descriptive Ethnology of Bengal* (Calcutta, 1872) A Bengali-Garo Dictionary was published by Ramkhe (Tuva, Assam, 1887) Consult Crooke, *Natives of India* (London, 1907)

GAR PIKE See GAR

GARRARD, găr'ard, JAMES (1749–1822) One of the early governors of Kentucky, born in Stafford Co., Va He was a militia officer in the Revolutionary War and a member of the Virginia Legislature In 1783 he removed with the early settlers to Kentucky, settling near the present Paris, for a time he was a Baptist minister and afterward a Unitarian. In 1791 he drew up a petition for a constitutional amendment forbidding slavery in Kentucky He was a member of the convention which framed the first constitution for Kentucky and from 1796 until 1804 was Governor of the State In 1798, in his message to the Legislature (November 7), he attacked the Alien Law in terms very like Jefferson's in the Kentucky Resolutions A county in Kentucky formed in 1796 bears his name Consult Des Cognets, *Governor Garrard His Descendants* (Lexington, Ky, 1898)

GARRARD, KENNER (1828–79) An American soldier, born in Cincinnati, Ohio He graduated at West Point in 1851, was on frontier duty and topographical duty for the most part until 1861, was captured in April, 1861, by Texan troops, and was exchanged in August, 1862 In 1861–62, while on parole, he was commandant at West Point He became a colonel of volunteers in September, 1862, served in the Rappahannock campaign and the Pennsylvania campaign, at Fredericksburg, Chancellorsville, and Gettysburg, was promoted brigadier general of volunteers in July, 1863, and major in the regular (cavalry) service in November, served in the Rapidan campaign from October to December, 1863, and was in charge of the Cavalry Bureau at Washington In 1864 he commanded the Second Cavalry Division of the Army of the Cumberland in the various operations about Chattanooga and in the invasion of Georgia, and from December, 1864, to July, 1865, the Second Division of the Sixteenth Army Corps in the battle of Nashville, the capture of Blakely, and the movement upon Montgomery In December, 1864, he was brevetted major general of volunteers and brigadier general in the regular army, and on March 13, 1865, received the brevet of major general, U S A He commanded the District of Mobile from August to September, 1865, was mustered out of the volunteer service in August, 1865, and acted as assistant inspector general of the Department of the Missouri from March to November, 1866, when he resigned from the service He was a member of the Cincinnati Plotting Commission (1871–79) and of the City Sewage Commission (1875–79) He wrote *Molan's System for Training Cavalry Horses* (1862)

GAR'RAWAY'S COFFEEHOUSE A famous London coffeehouse, in Exchange Alley, Cornhill, which existed for over 200 years It was originally kept by one Garway, a dealer in coffee and tobacco It is the scene of the first tea sales in London, also of the meetings of the shareholders of the South Sea Scheme

GAR'RETSON, AUSTIN BRUCE (1856–) An American labor-union official He was born at Winterset, Iowa, and was educated in the Osceola (Iowa) high school He served as a conductor on various railroads until 1889, when he became vice president of the Order of Railway Conductors, in 1906 he was elected president of the order He also became president of the mutual-benefit department of the order, editor in chief of the *Railway Conductor*, and a member of the executive committee of the National Civic Federation In 1912 he was a member of the Federal Commission on Industrial Relations He was one of the leaders in the threatened railroad strike of 1913, which was successfully arbitrated

GARRETSON, FREEBORN (1752–1827) An American pioneer Methodist, born in Maryland In 1775 he became an itinerant preacher for the Methodist denomination and in 1784 was elected presiding elder He also served four years as a volunteer missionary in Nova Scotia, and with 12 young ministers he organized the evangelical work in western New England and in eastern New York

GAR'RETT. A city in Dekalb Co, Ind, 18 miles north of Fort Wayne, on the Baltimore

and Ohio Railroad (Map Indiana, G 2) It is a railway division point and has machine shops, car shops, and a roundhouse The city contains also a Carnegie library and the Sacred Heart Hospital Under a charter of 1892 it is governed by a mayor and a unicameral council The water works and electric-light and heating plants are owned by the municipality Pop, 1900, 3910, 1910, 4149

GARRETT, ALEXANDER CHARLES (1832–1924) An American Protestant Episcopal bishop, born in Ireland He graduated at Trinity College, Dublin, in 1855, was curate of East Worldham, Hampshire (1856–59), and until 1869 served as a missionary in British Columbia In 1870 he became rector of St James's Church, San Francisco, and in 1872 dean of Trinity Cathedral, Omaha In 1874 he was appointed Missionary Bishop of northern Texas and retained the bishopric after the formation of the diocese of Dallas He wrote *A Charge to the Clergy and Laity of North Texas* (1875), *Historical Continuity* (1875), and the *Baldwin Lectures on the Philosophy of the Incarnation*

GARRETT, JOÃS DE ALMEIDA See ALMEIDA-GARRETT

GARRETT, JOHN WORK (1820–84) An American railroad president, born in Baltimore. After pursuing a course of study in Lafayette College he entered, at the age of 19, upon business life in a firm with his father and brother—Robert Garrett and Sons He became identified with the Baltimore and Ohio Railroad as a director in 1857, and as president in 1858, and during the remainder of his life devoted his energies to the development of this system Under his administration the line became one of the most important means of communication between the seaboard and the interior During the Civil War the road, which followed the Potomac River along a great distance of its way, was crossed and recrossed by the contending armies and was frequently broken by the Confederate forces But the repairs were quickly made, and the road continued to be of the greatest service to the United States government in the transportation of troops and materials Mr Garrett was closely associated with Johns Hopkins (founder of the university and the hospital which bear his name) He was one of the original trustees of the Johns Hopkins Hospital and University and a liberal contributor to the Young Men's Christian Association, the Maryland Institute, and the Association for the Improvement of the Condition of the Poor His son Robert succeeded to the presidency of the Baltimore and Ohio Railroad in 1884 Consult Scharf's *History of Baltimore City and County* (Philadelphia, 1881)

GARRETT, THOMAS (1789–1871) An American merchant, distinguished as a philanthropist and reformer He was born in Upper Darby, Pa, of Quaker parentage, learned the trade of a cutler and scythe maker, and in 1820 removed to Wilmington, Del, where he became an iron and hardware merchant Here, also, he avowed his antislavery opinions without reserve and became widely known as the friend of the slaves and of negroes generally His name was familiar to the slaves of Delaware, Maryland, and Virginia, and during a period of 40 years there was a constant procession of fugitives seeking his protection and aid It is said that not less than 3000 of them were indebted to him for their freedom. He was compelled to resort to many ingenious devices in his work, but he made no secret of the fact that he was engaged in it, and such was his reputation for success that few slaveholders thought it worth while to pursue their runaways any farther after learning that they had fallen into his hands In 1848 he was prosecuted by James Bayard before Judge Taney (q v), was finally convicted on what appears to have been insufficient evidence of having abducted two slave children, and was fined so heavily as to render him penniless His business would have been utterly broken up at this time if his fellow citizens of Wilmington had not volunteered to furnish him all the capital he needed

GAR'RICK, DAVID (1717–79) A celebrated English actor, long manager of Drury Lane Theatre, and the author of numerous comedies Descended on his father's side from a family of Huguenot refugees named De la Garrique, he was born at Hereford, Feb 19, 1717, and educated at Lichfield, the home of his mother's family During his youth he went to live with an uncle, who was a wine merchant in Lisbon, but he soon returned to England and became a pupil of the famous Dr Johnson A few months later, in 1736, master and pupil left Lichfield together in the hope of improving their fortunes in London Garrick attempted the study of law, then for a time he engaged in the wine business, his uncle having left him £1000, but the dramatic instincts which he had shown even as a schoolboy proved too strong, and after some amateur acting and falling in love with the famous Peg Woffington, he made, under an assumed name, his début on the stage at Ipswich (1741) in a play called *Oroonoko* He succeeded so well that on October 19 of the same year he appeared in London in the character of Richard III After being engaged for the following season at Drury Lane, Garrick went in the summer of 1742 to Dublin, where he excited the Hibernian enthusiasm to an extraordinary degree His success in London, however, was not without unpleasant incident, for a quarrel arose between him and his friend Macklin, which was taken up by their partisans, and on one occasion Garrick's performance had to be given up In 1747 he became one of the patentees of Drury Lane Two years later he married Mademoiselle Violette, an excellent danseuse from Vienna This seems to have alienated some of his company, especially of the feminine members, who went over to the opposition house, and in 1750 occurred the famous rivalry, when Drury Lane and Covent Garden were each playing *Romeo and Juliet*, Garrick and Mrs Bellamy at the former and Spranger Barry (q v) and Mrs Cibber at the latter, till after a dozen nights the town was tired and Covent Garden gave up the field In 1763 Garrick visited the Continent and made the acquaintance of Diderot and other noted people He conducted in 1769 the memorable jubilee at Stratford-on-Avon in honor of Shakespeare To Garrick seems to belong much of the credit of bringing back to the stage Shakespeare's plays in their original form, in place of the altered versions which had commonly been in use since the Restoration During his management also at Drury Lane he made an end of the old custom of admitting spectators upon the stage and introduced other improvements His own last appearance was on June 10, 1776, in *The Wonder*, when at the close of the play he made an affecting speech of farewell His health was failing, and he died less than three years later, in Lon-

don, Jan 20, 1779 He was buried beneath the Shakespeare monument in Westminster Abbey

Garrick is regarded as the greatest of English actors He exhibited a Shakespearean universality in the representation of character and was equally at home in the highest flights of tragedy and the lowest depths of farce But the naturalness which so distinguished him upon the stage often forsook him in real life He was extremely sensitive to ridicule and had a curious fashion of forestalling the malice of the critics by bringing out, on occasion, pamphlets of bantering attack upon himself In his financial affairs he was considered close, though his generosities were many He left a fortune of about £100,000 He was on terms of intimate friendship with Johnson, Goldsmith, Burke, and other men of letters, and was a member with them of the famous Literary Club As an author, he does not rank very high, though some of his farces, like *The Lying Valet*, have been repeatedly published, and his prologues were often extremely ingenious A collected (partial) edition of his dramatic works was brought out in London in 1768 and again in 1798. Many of his letters are preserved in the Forster collection at the South Kensington Museum On his life, consult Knight (London, 1894); Fitzgerald (ib, 1868), Murphy (Dublin, 1801), Davies (London, 1780), "Mémoires de Garrick," in *Bibliotheque de mémoires relatifs à l'histoire de France pendant le XVIII siècle*, vol vi (Paris, 1878), and Boaden (ed), *The Private Correspondence of David Garrick*, with a biographical memoir (London, 1832); Parsons, *Garrick and his Circle* (Boston, 1907).

GARRICK CLUB. A famous club in London, named in honor of the great actor David Garrick It was founded in 1831 for the promotion of letters and especially of the drama and in 1864 took up its present headquarters in Garrick Street. It possesses an important and valuable collection of portraits of celebrated English actors, which are shown to members' visitors on every Wednesday. Here occurred the controversy between Thackeray and Edmund Yates which brought about the estrangement between the former and Dickens

GARRISON, LINDLEY MILLER (1864–) An American lawyer and cabinet officer, born at Camden, N J He was educated at the Protestant Episcopal Academy (Philadelphia), Phillips (Exeter) Academy, and Harvard University, and he studied law in Philadelphia He was admitted to the Pennsylvania bar in 1886 and to the New Jersey bar in 1888, practicing in Philadelphia and in Camden, N J, and, as a member of the law firm of Garrison, McManus, and Enright, in Jersey City, N J, from 1899 to 1904 He served as vice chancellor of New Jersey from 1904 to 1913 and then became Secretary of War in President Wilson's cabinet

GARRISON, WENDELL PHILLIPS (1840–1907) An American editor and author, born at Cambridgeport, Mass, a son of William Lloyd Garrison He graduated at Harvard in 1861 and was literary editor of the *Nation*, of New York, from 1865 to 1906, having assisted E L. Godkin (q v) in founding that paper Henry Villard, who joined the *Nation* and the *Evening Post*, was Garrison's brother-in-law Garrison contributed to periodicals, compiled *Bedside Poetry A Parents' Assistant* (1887), and wrote *What Mr Darwin Saw on his Voyage around the World* (1879), with his brother, F J Garrison, a life of their father, *William Lloyd Garrison* (4 vols, 1885–89), *Parables for School and Home* (1897), *The New Gulliver* (1898), a satire on Calvinism, and *Memoirs* (1904) of Henry Villard Consult *Letters and Memorials of W. P Garrison* (Cambridge, Mass, 1908), containing poems, editorials, and essays, and *The New Gulliver*

GARRISON, WILLIAM LLOYD (1805–79) The leader of the radical Abolitionists in the antislavery struggle in the United States He was born at Newburyport, Mass, Dec 10, 1805 As an apprentice in the Newburyport *Herald* office (1818–25) he became an expert printer, and, while yet a boy, foreman, and contributor to that and other newspapers, and in 1826 was editor of the Newburyport *Free Press* Soon afterward, as a journeyman in Boston, he met and was deeply influenced by Benjamin Lundy (q v), a pioneer Abolitionist After a year spent in editing the *National Philanthropist*, a Boston temperance paper, and the *Journal of the Times*, at Bennington, Vt, he joined Lundy at Baltimore, in September, 1829, in conducting the *Genius of Universal Emancipation* The views of the two associates differed widely, for Lundy favored gradual abolition and colonization, which Garrison opposed This phase of activity was short-lived, for editorials urging immediate emancipation presently repelled subscribers The public mind, however, long indifferent to the evils of slavery, began to be aroused, though the agitation found foes more readily than friends In April, 1830, Garrison was convicted of libel After seven weeks in jail his fine was paid by Arthur Tappan, of New York, and the reformer turned to lecturing in Northern cities with a vehemence and fire not previously brought to this task. From this time dates the birth of a public sentiment which was to make slow headway against difficulties and opposition and finally to triumph through a civil war

In January, 1831, appeared in Boston the *Liberator*, a small sheet, soon to be enlarged and conducted weekly by Garrison till the end of 1865 The first number gave its keynote "I will be as harsh as truth and as uncompromising as justice. On this subject I do not wish to think or speak or write with moderation" Such a tone compelled attention, and the editor was widely denounced as a "wild enthusiast," as a "fanatic," and as a "public enemy" Apathy gave place to excitement, in the North as well as in the South. Hundreds of letters threatened Garrison's life, in December, 1831, Georgia offered $5000 for his arrest and prosecution, and on Oct 21, 1835, a mob, led or incited by reputable Bostonians, broke up one of his meetings and dragged him through the streets until he was rescued with difficulty by the police, who placed him in jail to insure his safety. In January, 1832, Garrison, with 11 associates, founded the New England Anti-Slavery Society, the parent of similar organizations In this year he published *Thoughts on African Colonization*, denouncing that futile scheme of the moderate opponents of slavery. In 1833 he went to England to confer with the British emancipators, and on his return supplied a platform for the American Anti-Slavery Society, founded in December of that year in Philadelphia. Of this he was president from 1843 to 1865. He visited England several times subsequently to 1833 on antislavery missions.

Meanwhile the American Abolitionists divided The moderate wing, which favored political action and objected to participation of women in their meetings, parted from their former comrades in 1840 and contributed to form the Liberty and Free-Soil parties The extremists, who obtained or soon gained control of the societies, were more logical in disregarding the distinction of sex no less than that of color and more "thorough" in disowning a government which acknowledged and protected "the sin" of human bondage In 1840 Garrison denounced the United States Constitution, to the horror of most, as "a covenant with death and an agreement with hell" In 1854 he burned the Constitution at an open air celebration of the Abolitionists in Framingham, Mass He hailed the secession of South Carolina and the guns fired on Fort Sumter as the end of "the pro-slavery Union" Many wrought with him in urging the President to recognize the situation as it was With the Proclamation of Emancipation their triumph came, and with the end of the war their leader's occupation was gone With other eminent guests of the government he saw the flag replaced over Sumter No longer a lonely protagonist, his age was provided for in 1868 by a "national testimonial," through admirers of his altruistic labors, and his last years were spent in less arduous journalistic and reforming services, with honor at home and abroad He died in New York, May 24, 1879 Of his *Sonnets and Other Poems* (1843), some had been penciled on the walls of his Baltimore cell in 1830 Selections from his writings and speeches appeared in 1852, and *The Words of Garrison, 1805–1905*, in 1905 Consult the biography by his sons, W P and F J Garrison, *William Lloyd Garrison, 1805–79 The Story of his Life Told by his Children* (4 vols, New York, 1885–89), Goldwin Smith, *The Moral Crusader, William Lloyd Garrison* (ib, 1892), Crosby, *W L Garrison, Non-Resistant and Abolitionist* (Chicago, 1905), and biographies by L Swift (Philadelphia, 1911) and J J Chapman (New York, 1913)

GARROD, găr′rod, SIR ALFRED BARING (1819–1907) An English physician, born at Ipswich He studied at University College and the University of London, was appointed assistant physician at University College Hospital in 1847 and in 1851 physician and professor of therapeutics and clinical medicine In 1863 he was appointed physician, in 1874 consulting physician, to King's College Hospital, and in the former year also became a professor in the college He was elected a fellow of the Royal College of Physicians in 1856 and its vice president in 1888 In 1858 he became a fellow of the Royal Society of Great Britain and in 1896 physician extraordinary to Queen Victoria His researches have been connected principally with the pathology of gout and rheumatic gout, or rheumatoid arthritis, on whose nature and treatment he published in 1860 a valuable work He introduced lithia as a remedy for gout He wrote also *The Essentials of Materia Medica and Therapeutics* (1885; many subsequent editions), which became authoritative on the subject and has been much used for textbook purposes

GARROD, ALFRED HENRY (1846–79) An English zoölogist and physician, born in London, and educated there at University and King's Colleges In 1871 he was elected prosector to the Zoological Society of London and in 1873 a fellow of St John's, Cambridge From 1874 until his death he was professor of comparative anatomy at King's College, London, in 1875 was appointed professor of physiology at the Royal Institution of Great Britain, and in 1876 was elected a fellow of the Royal Society His zoological studies were of high value, in particular those connected with the anatomy of birds, in which department he was a recognized authority His publications include an edition (1879) of a monograph by Johannes von Muller (q v), the physiologist of Berlin, on the vocal organs of passerine birds, and numerous papers collected and edited by W H Forbes (1881)

GAR′ROT The golden-eye duck (see GOLDEN-EYE), a French name used in English books Consult Newton, *Dictionary of Birds* (London, 1893–96)

GARROTE, găr-rōt′ (Sp, stick) A mode of execution practiced in Spain and Portugal Originally it consisted in simply placing a cord round the neck of a criminal, who was seated on a chair fixed to a post, and then twisting the cord by means of a stick inserted between the rope and the back of the neck till strangulation was produced Later an iron collar was used, worked by a screw To such condemned persons as recanted the Inquisitors granted as a favor this mode of strangulation before they were burned If the executioner was unskillful, however, the pain was sometimes very great Garroting is also the name given to a species of robbery in which the highwaymen suddenly came behind their victim and, throwing a cord, or handkerchief, or something of the sort round his neck, produced temporary strangulation till their purpose was effected This form of crime became common in England in the early sixties, but was checked by a Law of 1863 which added flogging to the usual penalty for one convicted of this crime Consult William Andrews, *Bygone Punishments* (London, 1899)

GAR′ROW HILLS See GARO HILLS.

GARRUCCI, gar-rōō′chē, RAFFAELE (1812–85) An Italian archæologist He was born Jan 23, 1812, became a Jesuit (1826), and after De Rossi was the greatest explorer of the catacombs of Rome He died at Rome, May 5, 1885. Of his numerous writings the masterpiece is *Storia dell' arte cristiana nei primi otto secoli della chiesa* (1872–81) His life was published by Di Montescaglioso (Naples, 1885)

GARRU′PA. A fish See GROUPER

GARSHIN, gar′shĕn, VSYEVOLOD MIKHAILOVITCH (1855–88) A Russian author, born in the Government of Yekaterinoslav From his earliest childhood he was a voracious reader At the age of nine he entered a St Petersburg gymnasium On graduation in 1874 he entered the School for Mining Engineers, but left it to enroll as a volunteer in the army sent to Turkey in 1877, where he distinguished himself in attacks upon the enemy until he was wounded and sent back to Russia He based his powerful story *Four Days* on an incident that occurred after the first skirmish The story itself, and the Turgenev like mastery of detail and narration, all combined to produce a sensation A series of stories of about 25 to 50 pages followed, each increasing his popularity and fame, but in 1880 the mental malady which had already attacked him broke out anew, and nearly two years were spent in sanitariums and out-of-the-way villages to recuperate. In 1883 Garshin

again resumed his literary work, was appointed secretary to the Railroad Congress, and married a physician His frail constitution needed all the care she bestowed on him His health improved, but in 1888 he killed himself in a fit of insanity In all his sketches there is a noticeable lack of the epic element, the outward description of his personages is utterly neglected in the exposition of the labyrinth of conflicting emotions and feelings But, as psychological studies, his sketches, dealing mostly with moral and social questions in the manner of Tolstoy, are the nearest approach to the latter's mastery Besides the sketch mentioned, *The Journal of Private Tvánov* and *The Red Flower* are notable examples of his peculiar art The latest edition of his works is that of 1910 Most of his work has been translated into French and German, and some of it into English.

GAR'STANG, JOHN (1876–) An English archæologist, born in Blackburn, the son of Walter Garstang, a physician and specialist on fisheries He was educated at Jesus College, Oxford, and became reader in Egyptian archæology at the University of Liverpool in 1902 and professor of archæology there in 1907 He was engaged in excavations in Roman Britain, in Nubia, in northern Syria and Asia Minor (1907, 1908, 1911), and in Egypt, especially at Meroe (1909–14) He wrote *El Arâbeh* (1902) and *A Short History of Ancient Egypt* (1904), both with P E Newberry, *The Land of the Hittites* (1910), *Meroe* (1911), *On Lucian's De Dea Syria* (1913)

GAR'STON A town and port of Lancashire, England, on the Mersey estuary, 5½ miles southeast of Liverpool (Map England, D 3) It has a large coal-shipping trade, its two docks belonging to the London and North Western Railway Company The town maintains parks, recreation grounds, an isolation hospital, and has technical schools and a free library Coal is the chief article of export Pop, 1901, 17,300, 1911, 23,852

GAR'TER, ORDER OF THE. The highest order of chivalry in Great Britain The Order of the Garter was instituted by King Edward III and though not the most ancient is one of the most famous of the chivalrous orders of Europe The original number of the knights of the Garter was 25, the Sovereign himself making the twenty-sixth The story goes that the Countess of Salisbury let fall her garter while dancing with the King and that the King stooped quickly to pick it up This occasioned some indelicate jokes which caused the Countess to withdraw The King exclaimed angrily, *Honi soit qui mal y pense* (Shame to him who evil thinks), and added that he would make this blue ribbon so glorious that all the courtiers would desire it This story has absolutely no foundation in fact. Edward had formed the plan for the order in 1344 and instituted it on April 23, 1349 Its patrons were Holy Trinity, the Virgin Mary, St Edward the Confessor, and St George, but the last, who had become the tutelary saint of England, was considered its special patron, and for this reason it has borne the title of "The Order of St George" as well as of "the Garter" A list of the original knights or knights founders is given by Sir Harris Nicolas The order was reorganized in 1831, when the number of knight companions was left at 25, but the membership extended to include the Prince of Wales and such descendants of George I and foreign sovereigns as might be chosen The emblem of the order is a dark blue ribbon edged with gold, bearing the motto *Honi soit qui mal y pense* in gold letters It is worn on the left leg below the knee The Grand Master is always the monarch of England The number of members in 1906 was 55 The officers are the prelate (the Bishop of Winchester), the chancellor (the Bishop of Oxford), the registrar (the dean of Windsor), the herald (the Garter King-at-Arms) (q v), and the Gentleman Usher of the Black Rod Consult Nicolas, *History of British Orders of Knighthood* (London, 1841–42), Ashmole, *Order of the Garter* (ib, 1672), Beltz, *Memorials of the Order of the Garter* (ib, 1841), Gallwey, *History of the George Worn on the Scaffold by King Charles I* (New York, 1908) See Plate II of ORDERS

GARTER KING-AT-ARMS. An officer of the Order of the Garter (q v) and the chief heraldic authority in England The office was instituted by Henry V, in 1417, with the advice and consent of the knight companions The duties of the Garter are to attend upon the knights at their solemnities, to inform those chosen to the order of their election and to summon them to the installation, to marshal funeral processions, to assign lords to their places in Parliament, and to be the executive officer of the King for the order The Garter is also the principal king-at-arms, taking precedence over the other two kings-at-arms in England. He is a member of the "Heralds' College," or "College of Arms," of which the Earl Marshal is the head The Garter grants and confirms arms under the authority of the Earl Marshal, but as Garter King-at-Arms he is independent of him See HERALDS' COLLEGE

GARTER SNAKE (so called from its color stripes) An elastic name given in North America to any of various small snakes, but properly applied to striped species of the genus *Eutænia*, which includes those most often seen of all our serpents The genus is widespread and contains, according to Cope, 24 species north of the Isthmus of Panama Other authors recognize from 12 to over 50 Several of these are very slender, mainly green with lighter stripes, and are popularly distinguished as ribbon snakes (q v) One Oregon species is black, and some semitropical species have the stripes broken so as to form series of spots or crossbars The best-known species is the ordinary garter snake (*Eutænia sirtalis*), which has the widest range of all species of the genus, being distributed over the whole of the United States, southern Canada, and Mexico Throughout this large area it presents a wide series of variations which have been distinguished by Cope, *Annual Report of the United States National Museum* (Washington, 1898), as 11 subspecies One recent author has reduced this number to five

The length of the garter snake when fairly grown is about 3 feet, of which from one-fourth to one-fifth belongs to the tail As a species, it is the most widely distributed and most numerous in individuals of all our serpents, except in the Western arid regions This is due to its extreme fecundity, to its agility and ingenuity in pursuit of food or in escape from danger, and to its willingness to fight off assailants It is to be found in all sorts of situations, but is partial to grassy meadows and to

the borders of streams, where the frogs, toads, fish, mice, and shrews upon which it mainly feeds are numerous, and it takes to water willingly and swims well Some other species of the genus are almost habitually water snakes All garter snakes are able to climb well, wriggling easily up a rough tree trunk, a wall of brick or of rough boards, and they search the bushes for eggs and young birds in the spring, but rarely climb high They are bold in coming about gardens and village streets, but enter cellars, dairies, and chicken houses less often than do some larger serpents, such as the milk snake All garter snakes retain the eggs in the oviduct of the mother until they hatch and the embryos have reached a length of 5½ to 7 inches, when they are extruded, from 25 to 75 being produced (late in summer) by a single female, but when so many are born some will be small or even confined within the egg covering when pressed from the vent These young are able at once to take care of themselves and will struggle vigorously for earthworms, etc They remain together and are watched and protected by the mother, who will brave formidable perils in her anxiety for their welfare It has been asserted repeatedly by credible witnesses that she receives them into her mouth and throat for temporary refuge from danger, whence they emerge as soon as possible The courage and pugnacity of this snake are familiar facts, it is the only one of our common snakes that will ever come towards a man with threatening demeanor when attacked Its bite is quite harmless so far as poison is concerned, but its strength and weasel-like courage make it a successful antagonist of many animals whose size would seem to give them immunity It is itself, however, the favorite prey of the black snake, copperhead, and of many reptile-hunting birds and mammals On the approach of cold weather these snakes seek some opening in the ground, creep as far in as practicable, and become dormant, emerging, however, rather earlier in the spring than most other serpents In the West the burrows of ground squirrels, badgers, etc, are favorite hibernacula, and in these retreats great numbers of the snakes often gather and entangle themselves into a ball of sleeping serpents—a practice induced probably by sexual impulses as well as by a desire for mutual comfort

In addition to the common and variable garter snake (*Eutænia sirtalis*) there occurs numerously in the eastern United States the ribbon snake (q v.) Florida has a local species (*Eutænia sackenni*), and the Mississippi valley and plains region possess a local species (*Eutænia radix*), which is peculiar in its fondness for water and a fish diet In the central region and on the Pacific coast is found another species (*Eutænia elegans*), which exhibits many variations of color and has habits similar to the eastern form Finally, many species belong to Mexico and Central America See SNAKE, and Plate of SNAKES, AMERICAN HARMLESS

GARTH, SIR SAMUEL (1661–1719) An English physician and poet He was born at Bowland Forest, Yorkshire, in 1661, was educated at Peterhouse, Cambridge, and studied medicine at Leyden Obtaining the degree of M D from Cambridge in 1691, he settled in London, where he was elected a fellow of the Royal College of Physicians (1693) and was soon recognized as a wit and conversationalist He was knighted in 1714 and appointed physician in ordinary to George I and physician general to the army He died Jan 18, 1719 Garth gained deserved fame in his own time for a satirical poem entitled "The Dispensary" (1699), in which he ridiculed those physicians who opposed his plan for establishing a free dispensary for poor people He also published "Claremont" (1715), a descriptive poem in imitation of Denham's 'Cooper's Hill," and two years later contributed to a translation of Ovid's *Metamorphoses* He was much admired by Pope and others His verse is smooth but monotonous Consult the sketch of Garth in Johnson's *Lives of the Poets* (London, 1854), and Chalmers, *Works of the English Poets*, vol ix (ib, 1810)

GARTNER, gärt'nĕr, FRIEDRICH VON (1792–1847) A distinguished German architect, born at Coblenz The son of an architect, he studied first under his father at Munich, then in Paris under Percier (1812), and finally in Italy (1814–18) Two years later he was called to the chair of architecture in the Academy of Munich and began at the same time the practice of his art He designed the Ludwigskirche, the Feldherrn Halle, the Library, University, and Wittelsbacher Palace (all in Munich), the royal palace at Athens, and other important buildings In spite of the strongly classical bent of his early training most of his own work in Germany represents a consistent effort to revive mediæval Romanesque forms, and he was wisely intrusted with the restoration of the minsters of Speyer, Regensburg (Ratisbon), and Bamberg He was made head inspector of buildings, and director of the Academy at Munich In 1819 he published *Ansichten der am meisten erhaltenen Monumente Siciliens*

GARTNER, HEINRICH (1828–1910) A German landscape painter, born at Neustrelitz He was a pupil of Ruscheweyh, of F W Schirmer in Berlin, and of Ludwig Richter in Dresden, whence he went to Rome to study the old masters, and there was also much influenced by Cornelius He became favorably known after his return to Germany through several decorative cycles executed in private houses and villas and was commissioned to paint some of the mural decorations in the new Court Theatre at Dresden, and after that the encaustic paintings in the Hall of Sculptures in the Leipzig Museum (1879) Three great landscape compositions by him (1883–85) adorn the staircase of the Agricultural Museum in Berlin Of his oil paintings there is a "Landscape with the Return of the Prodigal Son" in the Leipzig Museum, and one with "Adam, Eve, Cain, and Abel" in the Dresden Gallery

GARTNER, JOSEPH (1732–91) A German botanist He was born at Kalw (Wurttemberg), studied at Tubingen and Gottingen, and after extensive travel was, in 1761, appointed professor of anatomy at the former university. From 1768 to 1770 he was professor of natural history and director of the botanical garden and the natural-history collection at the University of St Petersburg His most important work is *De Fructibus et Seminibus Plantarum* (1788–91), which, by its minutely accurate descriptions, comprising a thousand and more species, introduced a new era in plant morphology. The scientific value of the book was much increased by the addition of 180 copperplate engravings

GARTSHER'RIE A coal-mining district in Lanarkshire, Scotland, near Coatbridge (q v) A coal-cutting machine first used in the Baird pits here is known as the Gartsherrie coal-cutting machine

GARUM'NA See GARONNE

GARVE, gar've, CHRISTIAN (1742–98) A German philosopher He was born at Breslau, studied at the universities of Frankfort-on-the-Oder and Halle, in 1769 succeeded Gellert as professor of philosophy at Leipzig, but in 1772 was obliged by ill health to retire His writings did much towards the popularization of philosophy in Germany His work was highly valued by Kant and by Frederick II, who bestowed upon him a pension of 200 thalers and requested him to prepare a translation (1783, 6th ed, 1819) of Cicero's *De Officiis* Garve eulogized the King in the *Fragmente zur Schilderung des Geistes, Charakters und der Regierung Friedrichs II* (1798) Among his further publications are a collection of essays, *Ueber verschiedene Gegenstande aus der Moral, der Litteratur und dem gesellschaftlichen Leben* (1792–1802), and translations (1798–1801, 1799–1802) of the Ἠθικά and Πολιτικά of Aristotle.

GAR'VIE, ALFRED ERNEST (1861–) A British Congregational theologian, born in Zyrardow, Russian Poland, the son of a Scottish flax merchant He was educated at George Watson's College, Edinburgh, at the University of Glasgow, and at Oxford For a few years he was in business in Glasgow, but after leaving Oxford in 1893 became minister of the Macduff Congregational Church and in 1895 of Montrose Congregational Church In 1903–07 he was professor at Hackney and New colleges and then became principal of New College In 1902 he was president of the Congregational Union of Scotland He wrote *Ethics of Temperance* (1895), *Ritschlian Theology* (1899), *The Gospel for To-Day* (1904), *Religious Education* (1906), *Studies in the Inner Life of Jesus* (1908), *Handbook of Christian Apologetics* (1913), and commentaries on Romans and St Luke, and edited *The Westminster New Testament*

GARY, gā'rĭ. A city in Lake Co, Ind, 29 miles southeast of Chicago, on the Indiana, Baltimore, and Ohio, the Chicago, Indiana, and Southern, the Elgin, Joliet, and Eastern, the Indiana Harbor Belt, and several other railroads (Map Indiana, C 1) It is situated at the head of Lake Michigan, midway between the vast iron-ore beds of the north and the great coal region of the south, and this, together with its excellent railroad and water facilities, caused it to be chosen as the site for the main plant of the United States Steel Corporation, in April, 1906 Since then the growth of Gary has been rapid The city is now the greatest steel-producing place in the world Besides the Indiana Steel Company, its industrial establishments include the American Bridge Works, sheet and tin-plate works, a cement plant, locomotive works, a coke by-products factory, tube works, car and foundry works, etc Gary contains a Carnegie library, a fine city hall, two fine hospitals, and public parks It was named for E H Gary (q v) Pop, 1910, 16,802, 1920, 55,378

GARY, ELBERT HENRY (1846–1927) An American corporation official, born at Wheaton, Ill Educated at Wheaton College and at the University of Chicago (LL B, 1867), he was admitted to the Illinois bar in 1867 and to the bar of the Supreme Court of the United States in 1878 He was mayor of Wheaton for two terms, and county judge of Dupage County for two terms For 25 years he practiced law in Chicago, serving as railroad and corporation counsel for various companies He helped to organize, and became president of, the Federal Steel Company, and he was connected with the organization of the United States Steel Corporation, of whose board of directors and finance committee he later became chairman As such, he was prominently in the public eye during the government prosecution of the Steel Corporation as a monopolistic trust He was chosen a director in several Chicago and New York banks and other corporations See GARY, IND

GARY PLAN See SCHOOLS

GAS See GASES, GENERAL PROPERTIES OF

GAS, ILLUMINATING AND FUEL Gas for illuminating or heating purposes may consist of (1) a pure compound, such as acetylene, produced from calcium carbide, (2) air charged with volatile hydrocarbon vapor, such as naphtha and various mixtures of hydrogen, (3) hydrocarbon gases occurring as natural products and widely known as natural gas, (4) similar mixtures, with the addition of carbon monoxide, produced by the destructive distillation of bituminous coal, heavy hydrocarbon oils, and wood, also (5) a mixture of hydrogen and carbon monoxide produced by the decomposition of water in presence of incandescent carbon, enriched with oil gas, the whole popularly known as water gas Of the above mentioned, coal gas water gas, and natural gas are the most important and are handled on a large scale The others are of service in isolated localities or on moving vehicles

COAL GAS

Coal gas is the gas produced by the destructive distillation of bituminous coal

History. The existence of inflammable gases issuing from the earth has been known from

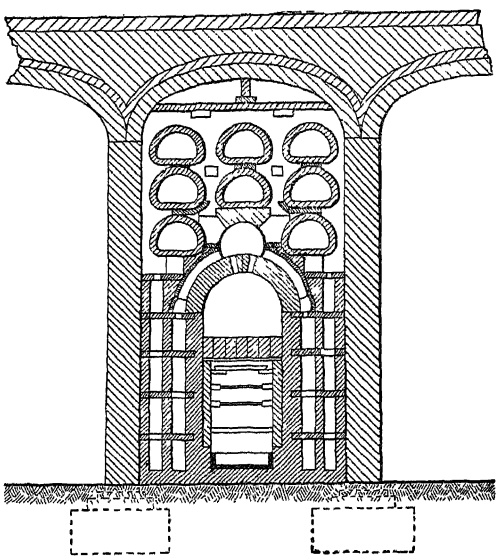


FIG 1. COAL-GAS RETORT, WITH DIRECT-FIRE FURNACE

very early times In 1659 Thomas Shirley communicated to the Royal Society a paper describing experiments on a gas issuing from a well near Wigan in Lancashire and resulting, in his

opinion, from the decomposition of coal Dr John Clayton, in a paper presented to the same society in 1739, described the production of a

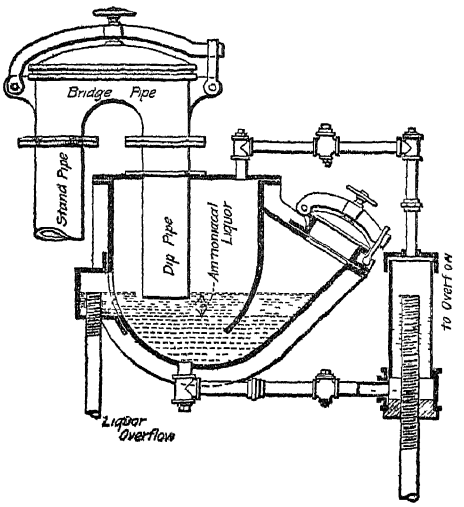


FIG 2 CROSS SECTION OF HYDRAULIC MAIN

similar gas from coal heated in a closed vessel It was not, however, until 1792 that the practical value of coal gas as an illuminant was demonstrated by William Murdock, a Scotchman, who constructed apparatus by which he lighted his home and office in Redruth, Cornwall In 1798 he moved to Soho and introduced the illuminant in the Soho foundry The experiment proved highly successful, and the plant was soon enlarged so as to give light to the principal shops in the vicinity In 1805 Murdock introduced gas in the cotton mills in Manchester Meanwhile Lebon had used coal gas in his home in Paris in 1799, and his experiments attracted the attention of Winsor, the "father of modern gas lighting," who, on his return to England soon after, urged the use of coal gas for general illumination In consequence of his agitation various buildings in London were lighted by this means, but it was not until 1810 that he secured the incorporation of the Gas Light and Coke Company, and even then the royal charter was not granted until 1812 Westminster Bridge in London was first lighted by gas in 1813, and in 1815 Guildhall was similarly illuminated As a street illuminant, gas was first introduced in St Margaret's parish in London Paris was lighted in 1820, and thereafter the use of gas for street illumination was gradually extended throughout the Continent In the United States the use of illuminating gas was agitated as early as 1812, it was successfully introduced in Baltimore in 1821, in Boston in 1822, in New York gradually between 1823 and 1827

The Coal A good gas coal should contain only a small percentage of ash and sulphur and should yield, upon distillation, a comparatively large percentage of volatile matter of good illuminating value, and a good coke amounting to from 60 to 65 per cent of the original weight of the coal A gas coal showing the following analysis by weight may be considered as the standard for the United States: volatile matter

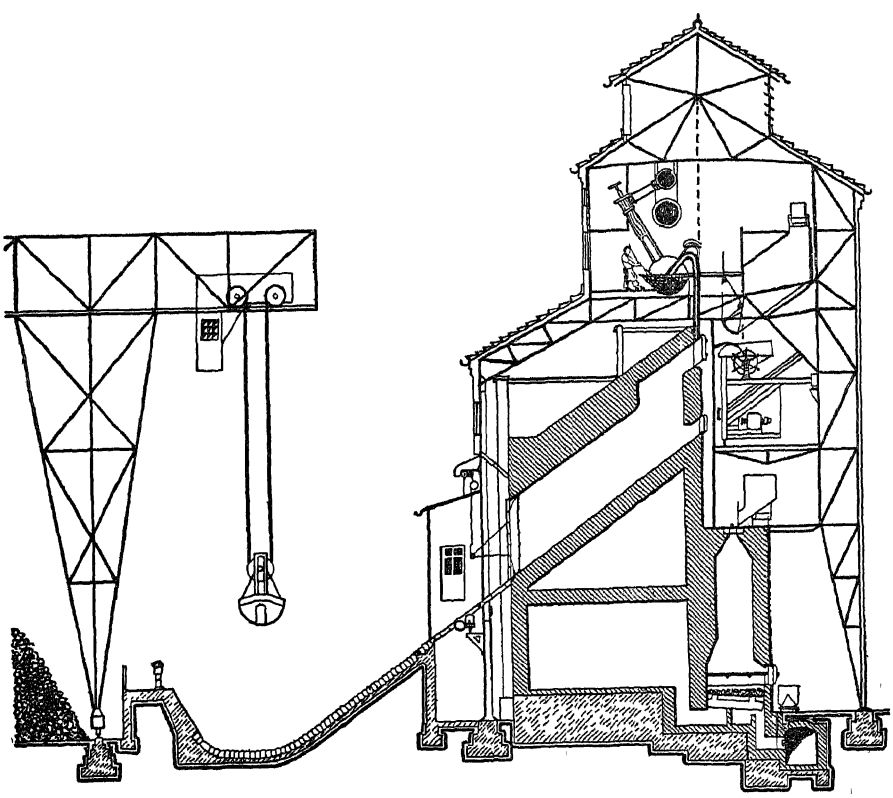


FIG 3. GAS PLANT WITH INCLINED RETORTS

33 to 35 per cent, fixed carbon, 55 to 60 per cent, ash, 4 to 6 per cent, sulphur, 0 4 to 0 6 per cent A pound of such coal will yield, upon distillation, about 5 cubic feet of gas, possessing an illuminating value of from 15 to 17 candle power when burned in an Argand burner

Good gas coals of practically the above composition are found in Pennsylvania, in the Pittsburgh fields, in the West Virginia and Kanawha fields, and also in Tennessee, Indian Territory, and Colorado, while others not so good are found in Alabama, Kansas, and Washington In Europe the coal fields of England furnish the best gas coals, these English coals being of very nearly the composition given above, except that they contain less ash, but more sulphur

Apparatus The distillation of the coal is carried on in closed retorts, heated by suitable furnaces Originally made of cast iron and circular in cross section, these retorts are now made of fire clay, are oval or D-shaped, and set horizontally or inclined Vertical retorts are square in section, with rounded corners, and larger at the bottom than at the top Horizontal retorts (see Fig 1) are of varying dimensions, a very common size for the United States being 16 inches × 26 inches × 9 feet inside, and are set in groups of from three to nine The furnaces by which these groups are heated are of two kinds—direct fire and generator In the former the carbon of the fuel is burned directly to carbon dioxide, while in the latter the combustion of the carbon is performed in two stages, the first taking place in the furnace proper and forming carbon monoxide, which is burned in the second stage to carbon dioxide, this secondary combustion taking place between the retorts The use of generator furnaces results in greater economy of fuel and the attaining of a higher temperature in the retorts than is possible with direct-fire furnaces These advantages are secured to a still greater degree by the use of recuperators, in which the heat of the outgoing products of combustion is transferred to the incoming air The retorts are either set horizontally or at an angle of about 30° to the horizontal (see Fig 3) The object of this inclination is to permit the charging of the coal into, and the discharging of the coke from, the retorts to be performed by gravity instead of by manual labor or by machinery, as is necessary when they are set horizontally In large gas works coal and coke handling machinery is employed, sometimes to such an extent that the coal is unloaded from the cars or vessels in which it is brought to the gas works, transported to the retort house, and charged into the retorts, and the coke drawn, carried to the yard, and stacked or loaded for sale without being touched by hand Retorts of the size mentioned will take charges of from 250 to 350 pounds of coal, according to the degree to which they are heated

To the open end of each of the retorts is bolted a cast-iron mouthpiece, of the same cross section as the retort, and from 14 to 16 inches deep On the outer end of the mouthpiece is hinged, so that it can be readily opened and closed, a cast-iron or steel lid, which, when closed, makes a gas-tight joint with the face of the mouthpiece At the mouthpiece a bell is provided, into which is inserted the lower end of the standpipe, or pipe through which the gas passes away from the retort On the top of the standpipe is a bridge or arch pipe, from which hangs a dip pipe, which is bolted to the hydraulic main (a large pipe generally U-shaped and made of steel, see Fig 2), and passing down into this main dips below the surface of the ammoniacal liquor, with which the main is partly filled, and by being thus trapped prevents the return of any gas to the retort when it is open for drawing and charging

Vertical retorts are of two types, intermittent and continuous, both of larger capacity than older forms, since they run from 1500 to 2000 pounds of coal per charge They are more economical of operation and are rapidly replacing the other types Fig 4 shows a vertical section of one of the latest forms

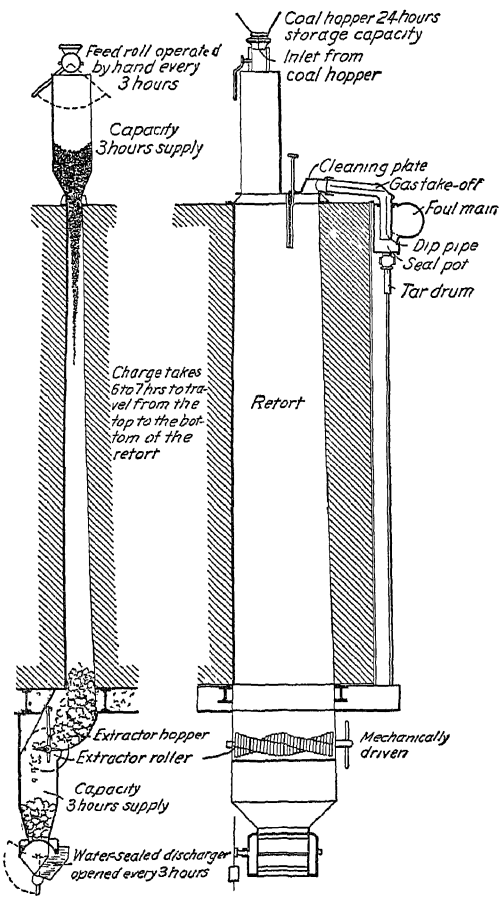


FIG 4 VERTICAL RETORT.

It is significant that the gas produced during the coke-oven operation has at last come into use as a public illuminant, particularly in Germany and England

From the hydraulic main the gas passes to the exhauster, a rotary pump employed to relieve the retorts of the pressure of the gas generated from the heated coal The rotary pump also pushes the gas into a tar extractor, in which the gas is subjected to friction for the removal of such of the heavy tar as has not been condensed out in the hydraulic main After the removal of the tar, which should be effected at a temperature not lower than 100° F., the gas passes to the condensers and is cooled to a temperature of about 50° to 60° F. These con-

densers may be either atmospheric condensers or water condensers The atmospheric condensers employ air, and have concentric steel shells forming an annular gas space exposed to air on both the inner and outer circumferences They are used to perform the first part of the cooling, which is completed by the water condensers, these being somewhat similar in construction to a tubular boiler, the water passing through the tubes in one direction, while the gas passes outside of them in the opposite direction

After cooling, the gas passes to the washers and scrubbers for the removal of the ammonia which it still contains In the washer and scrubber the gas is caused to pass in thin streams over wetted surfaces, the object being to expose the gas to intimate contact with water. Scrubbers are of two general types—tower scrubbers, vertical cylinders filled with bundles of thin boards which are wet by water caused to flow over them by the force of gravity, and rotary scrubbers, fitted with bundles of wooden rods mounted on a horizontal shaft and kept wet by being rotated through the water or ammoniacal liquor with which the lower part of the scrubber is filled

From the scrubber the gas passes to the purifiers These are usually four in number, and the gas passes through three of them consecutively, while the fourth is cut out for cleaning and refilling They are cast-iron boxes with open tops, which are closed by means of removable covers made of light steel plates When in place over the boxes, the sides of these covers are sealed in water contained in "cups" cast on the sides of the boxes, and the escape of gas is thus prevented The purifiers are filled with one or more layers of slaked lime or oxide of iron, the latter being the most commonly used in the United States

From the purifiers the gas passes to the station meter, where it is measured by means of a drum divided into either three or four compartments The meter is partly filled with water, and the inlets and outlets to the different compartments are so arranged in connection with this water that gas cannot simultaneously enter and leave a compartment The pressure of the gas causes the drum, which is mounted on a shaft, to revolve so that each compartment is alternately filled and emptied, and since each is filled with a definite volume of gas, the volume of gas passing through the meter is accurately measured and is recorded by suitable mechanism

After passing through the station meter the gas is conveyed to the gas holder, a cylindrical vessel open at the bottom, but closed on top, made of steel sheets The lower edge of the gas holder is always kept sealed in water contained in a masonry or steel tank, in which the holder is free to rise and fall, being guided in the tank and by columns rising above the tank to prevent tilting The guiding is performed by wheels attached at equal distances around the top and bottom of the cylinder, and in the case of telescopic holders at the top and bottom of each of the sections working against rails or channel irons fastened to the inside of the tank wall and of the columns All large gas holders are telescopic, i e, are made with one or more outer sections, which are merely rings, in addition to the inner section closed on top At the bottom of each of the sections, except the lowest, is a "cup" (see Fig 6) Gas is admitted to and drawn from the holder by pipes passing down on the outside of the tank under and through its foundation, and up on the inside to a point above the water level When gas is admitted, it enters the space between the closed top, or crown, and the water in the tank As it continues to enter, the pressure increases until it is sufficient to overcome the weight of the holder, which then begins to

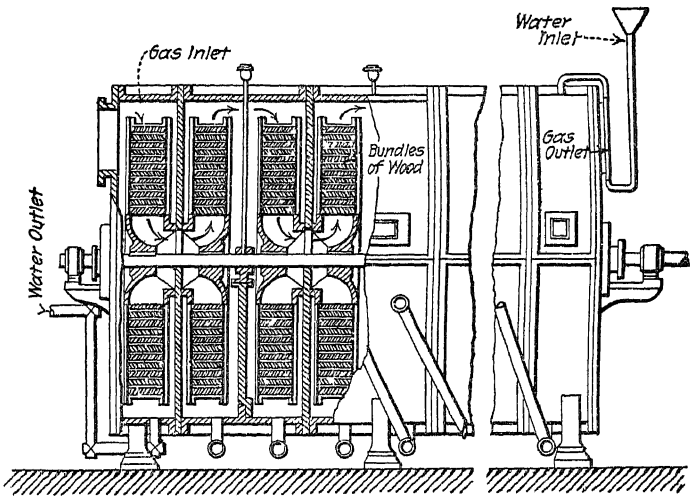


FIG. 5 SECTION AND ELEVATION OF ROTARY GAS SCRUBBER

rise and continues to do so as long as gas is entering faster than it is passing out When the inner section is completely filled with gas, the cup filled with water engages the grip of the next section and, as gas continues to flow into the holder, raises this section, the water in the cup forming a seal which prevents the escape of any gas When the holder descends, the outer section lands on the bottom of the tank, and, the inner section continuing to go down, the cup and grip separate The columns, by which the holder is guided and prevented from tilting as it rises above the tank, are built up of structural steel and are connected together at the top and intermediate points by girders, and also by diagonal ties, so that the whole of the guide framing is bound together into what is practically a rigid cylinder Originally built in very small sizes and with only a single lift, gas holders have been made larger and with more lifts, one at the East Greenwich Works in London consists of six lifts and contains, when full, 12,000,000 cubic feet of gas The largest holder built in the United States, at the Astoria Works, New York City, has lifts 300 feet in diameter and 245 feet high, capacity 15,000,000 cubic feet In some cases, usually those of comparatively small holders, the guide framing has been completely done away with, the guiding being performed by means of spiral guides fastened to

the inside of the tank wall and to the inner surfaces of the sections of the holder

Process of Manufacture When the coal is placed in the retort, the volatile matter is driven off by heat, rapidly at first and then more and more slowly The reactions taking place in the retorts are complex In general they consist of the decomposition of the coal into coke and heavy hydrocarbons, and the breaking down of the latter into lighter hydrocarbons, with the setting free of hydrogen and marsh gas and, when the breaking down is carried too far, of solid carbon, which is deposited on the interior of the retort Reactions also occur between some of the nitrogen and hydrogen, the hydrogen and sulphur, and the carbon and nitrogen by which comparatively small amounts of ammonia, hydrogen sulphide, and cyanogen are formed The coke which is left in the retort is composed almost entirely of carbon, with a percentage of ash dependent upon the amount of ash in the coal The extent to which the hydrocarbons are broken down increases with the temperature at which the retorts are maintained, the volume of the gas produced increases, and its illuminating value decreases The product of illuminating value and quantity depends, therefore, upon the heat, and the retorts are usually heated to a temperature of about 2000° F The gas produced is deteriorated in illuminating value if exposed to prolonged contact with the hot walls of the retort, and to reduce the extent of this contact to a minimum the volume of the charge of coal should be as large as possible in proportion to the size of the retort The existence of a pressure in the retort also increases the contact between the gas and the walls, and it is to avoid this, as well as leakage of gas through minute cracks in the clay, that the pressure is taken off the retort by means of the exhauster In the United States the length of charge or time the coal is left in the retorts is usually four hours, the heat and the weight of charge being so proportioned that the gas is all driven off in this time In England the length of charge is usually five to six hours

The gas leaving the retort is a mixture of permanent gases, principally hydrogen, marsh gas, and carbon monoxide, with some carbon dioxide, nitrogen, hydrogen sulphide, ammonia, and cyanogen Hydrocarbon vapors are the most important light-giving constituents The problem to be solved in the cooling of the gas is to leave in it a sufficient quantity of the lighter vapors to saturate it fully at the minimum temperature and maximum pressure to which it is to be subjected in the future After the gas has been cooled, it is necessary to remove the ammonia and hydrogen sulphide, and in some cases the carbon dioxide and cyanogen are also taken out

The heaviest of the vapors condense in the hydraulic main, forming tar, which must not be allowed to rise to the level of the lower edges of the dip pipes, since if brought into intimate contact with the gas it will absorb the lighter hydrocarbon vapors For this reason it is also necessary that the heavy tar that is not deposited in the hydraulic main should be removed from the gas before it is cooled, and this is done by the friction tar extractor The lighter tar is then condensed by the cooling effected in the condensers This cooling should be done very gradually to avoid the condensation of vapors that should be retained in the gas As the gas cools, some of the water vapor with which it is saturated condenses and absorbs a portion of the ammonia, forming ammoniacal liquor. The tar and ammoniacal liquor thus formed in the hydraulic main and the condensers are run off through suitable drains into wells The portion of the ammonia that still remains in the gas when it leaves the condensers is removed in the washer and scrubber By using weak ammoniacal liquor as the washing liquid in the first stages of the scrubbing, the ammonia is made to combine with carbon dioxide and hydrogen sulphide, the resulting liquor being an aqueous

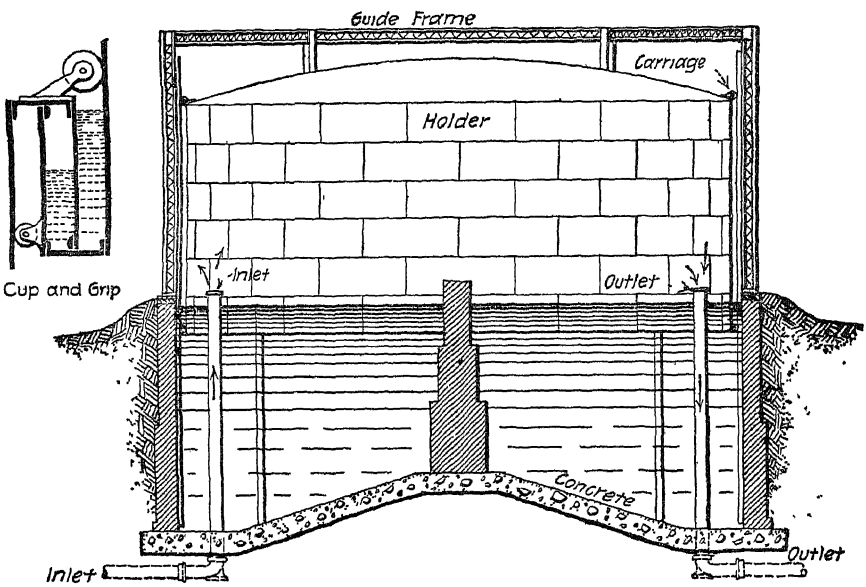


FIG 6 SECTION THROUGH GAS HOLDER

solution of carbonate, sulphide, and various other salts of ammonia

The gas leaving the scrubbers contains as impurities carbon dioxide and hydrogen sulphide, as well as small quantities of other sulphur compounds and cyanogen It is necessary to remove the hydrogen sulphide and reduce the sulphur compounds to an amount not to exceed 30 grains of sulphur per 100 cubic feet of gas, since these substances produce sulphurous oxide when burned, and thus give rise to disagreeable fumes if present in any quantity The carbon dioxide is sometimes removed also, although, being harmless except as it affects the illuminating value, it is usual in the United States to allow it to remain in the gas For its removal it is necessary to employ, in the purifiers, calcium hydroxide, which combines with it, forming carbonate of lime. Lime will also combine with hydrogen sulphide and was formerly the sole substance employed for its removal, which can, however, be effected much more economically by the use of hydrated sesquioxide of iron, either prepared artificially or in the shape of a natural bog ore, and this has largely superseded lime The reaction between the oxide of iron and the hydrogen sulphide results in the formation of sulphide of iron, which is again changed to oxide when the fouled material is exposed to the air. The material can thus be used over and over again until it becomes so charged with the sulphur, deposited at each revivification, as to be rendered inactive The oxide of iron also absorbs some of the cyanogen, and when spent is of value for the manufacture of cyanides After passing the purifiers the gas is ready for distribution by means of the gas holders

The scheme of condensation and purification outlined is the one usually employed, but it is becoming customary to scrub the gas with a solution of ferrous sulphate to remove the cyanogen completely and in a more merchantable form than is done in the purifiers Scrubbing with tar oils is also used to remove naphthalene, a volatile hydrocarbon which, when chilled, condenses at once to the solid form in light flakes, and at times causes much trouble by stopping the small pipes of the distribution system

It will be seen that in addition to the gas there are produced in the manufacture of coal gas coke, tar, and ammoniacal liquor, all of which are valuable—the coke as a fuel, the tar as a raw material for the manufacture of paving and roofing pitch, artificial dyestuffs, various drugs, etc (see COAL TAR), and the ammoniacal liquor as a raw material for the manufacture of ammonia in various forms The products from 2000 pounds of gas coal will be, about, 1200 pounds of coke, 10,000 cubic feet of gas, 13 gallons of tar, 20 pounds ammonium sulphate, and 3 5 pounds potassium ferrocyanide.

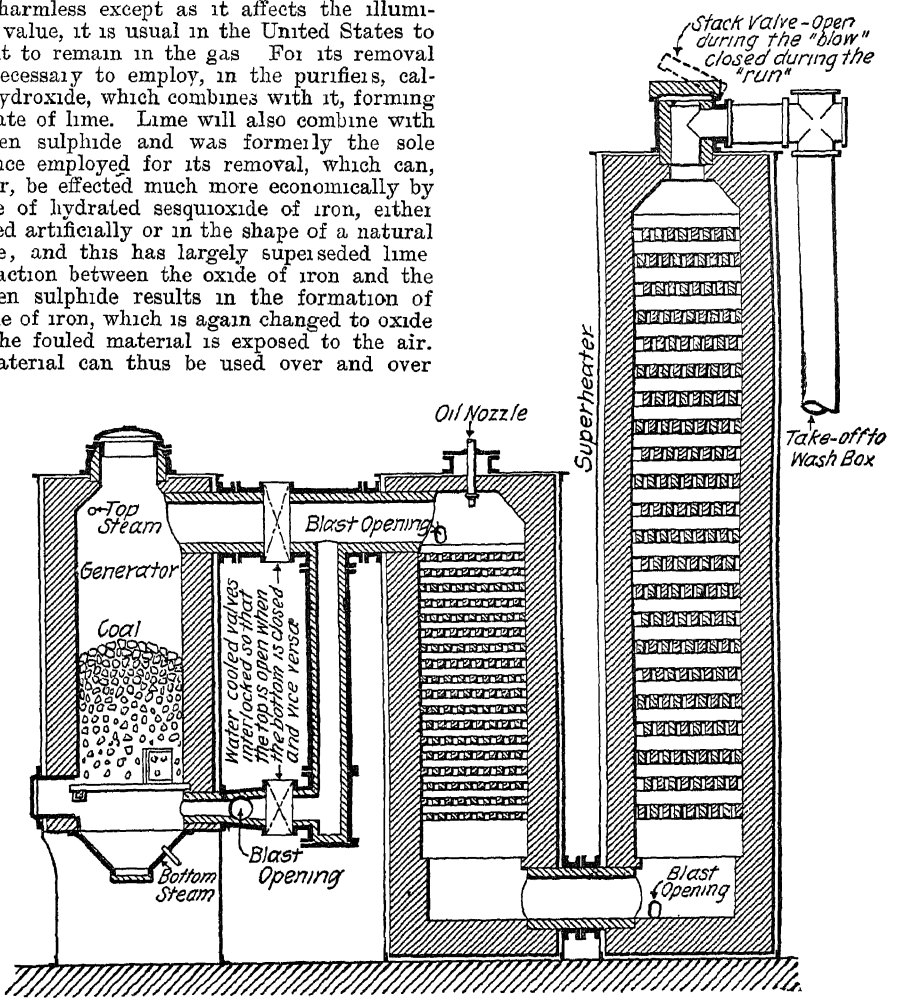


FIG 7 DOUBLE SUPERHEATER LOWE CARBURETED-GAS APPARATUS

CARBURETED WATER GAS

Carbureted water gas is made by decomposing steam in the presence of incandescent carbon so that the hydrogen is set free, and the oxygen unites with the carbon giving carbon monoxide These two gases, with small amounts of methane, carbon dioxide, and nitrogen, form what is

called "water gas," which, while combustible, burns with a nonluminous flame The gas is made luminous by mixing with gas made from oil

History Although it was shown by Fontana, in 1780, that a combustible gas could be formed by the reaction between steam and incandescent carbon at high temperatures, which is the basis of all water-gas manufacture, and between 1823 and 1858 many patents were taken out aiming to take advantage of this reaction, the commercial development of the manufacture of water gas and carbureted water gas is of comparatively recent date This development was made almost entirely in the United States, where both anthracite coal, a desirable source of carbon, and petroleum, for the manufacture of oil gas, were plentiful and cheap In the earlier forms of apparatus the water gas was made from anthracite coal raised to incandescence in externally heated retorts, similar to coal-gas retorts, and the amount of fuel required proved too great for the success of the process In 1871 Tessie du Motay erected in New York City an apparatus for the manufacture of "oxygen" gas, which, although it proved unsuccessful for this purpose, was later successfully developed into the generator-retort form of carbureted water-gas apparatus, and in 1873 Lowe erected, in Phœnixville, Pa, the first apparatus of the generator-superheated type, covered by his patent taken out in 1872 In 1875 Lowe took out, as a result of his experience in construction, another patent, the basic patent for apparatus of this class

Apparatus and Process of Manufacture. In the generator-retort, or Tessie du Motay, process, water gas is made in a generator, a steel shell lined with fire brick The generator is filled with anthracite coal, which after kindling is brought to incandescence by means of a forced blast of air. When the proper temperature is reached, the blast is shut off, the outlet for the escape of the products of combustion closed, and steam is admitted to the fire and is decomposed, forming water gas The water gas is led from the generator into a small gas holder, called a relief holder This is necessary, because the action of the generator is intermittent, and the production of water gas rapidly cools the fire below the gas-making temperature. The temperature must be brought back by again putting on the blast, while the gas must pass through the rest of the apparatus continuously and at a uniform rate From the holder it is led above a series of steam-heated shelves, on which naphtha is vaporized, and the mixture of gas and vapor then passes through externally heated retorts, the vapor being converted by the heat into permanent gases The crude carbureted water gas so formed is drawn from the retorts by an exhauster and condensed and purified, without being scrubbed, in the manner described under the heading *Coal Gas*

In the generator-superheater, or Lowe, type of apparatus (see Fig 7) the water gas is made and carbureted in one operation In its most common form it consists of three brick-lined steel cylindrical vessels connected and called the generator, the carburetor, and the superheater The generator contains the coal, and the carburetor and superheater are filled with fire brick piled in a checkerwork This checker brick is heated by the combustion of the producer gas formed in the generator while the coal is being brought to incandescence by a forced blast. When the proper temperature has been reached in all the vessels, the blast is shut off, the stack valve on top of the superheater, through which the products of combustion escape during the heating-up period, or "blow," is closed, and steam is turned into the generator As soon as the production of water gas begins, oil is admitted at the top of the carburetor, is vaporized by the heat of the checker brick, and is taken up by the water gas and carried through the checkerwork in the carburetor and superheater, being converted into a mixture of permanent gases by the exposure to heat to which it is thus subjected After leaving the superheater the gas passes through a water seal and is then cooled by the condenser and run into a relief holder An exhauster draws the gas from this holder and forces it through the purifiers and station meter into the storage holder The generator-superheater type is the one that is generally employed at present, having replaced all the earlier installations of the generator-retort type

Carbureted water gas is a mixture of essentially the same gases as are found in coal gas, though in different proportions, the following being representative analyses of each gas after purification by oxide of iron

	Coal gas	Carbureted water gas
	Per cent	*Per cent*
Carbon dioxide	1 2	3 8
Ethylene and benzene	3 2	11 4
Oxygen	4	2
Carbon monoxide	9 1	31 0
Methane	30 2	15 0
Hydrogen	48 5	32 9
Nitrogen	7 4	5 7

In the case of carbureted water gas, however, the crude gas contains no ammonia or cyanogen, and smaller amounts of sulphureted hydrogen and sulphur compounds than are found in crude coal gas It is estimated that from 70 to 75 per cent of the total amount of illuminating gas sold in the United States is carbureted water gas, while English gas works at present send out 14 per cent of carbureted water gas

DISTRIBUTION OF GAS

From the gas holder the gas is conveyed to the consumers by means of *main pipes*, laid under the surface of the streets, from which branch or *service* pipes are led to the houses The pressure on the mains, which varies in ordinary practice from 1½ to 4 inches of water ($\frac{1}{18}$ to $\frac{1}{7}$ pound per square inch), is furnished by the weight of the gas holder and is regulated to meet the variation in the demand for gas by men at the valves, or by a *governor* on the holder outlet This governor consists of a valve fastened to an inverted bell sealed in water, the weight of the valve and bell being supported by the pressure of the gas in the mains If this falls, the bell falls, opening the valve, and so, by allowing more gas to pass, brings the pressure back to the proper point The amount of pressure can be varied by the use of removable weights to vary the total weight to be supported

The main pipes vary in internal diameter from 3 to 72 inches They are usually cast-iron bell and spigot pipes, made in lengths 12 feet long, which are connected together with lead or cement

joints, but wrought-iron pipe with screwed joints is sometimes used for the smaller sizes The services are always made of wrought-iron pipe (See PIPES) The mains must be laid so as to drain to certain points, at which provision is made by means of "drips" for removing the water and such hydrocarbon vapors as condense from the gas, and the service pipes should drain into the mains

In recent years the use of high pressure (10 to 20 pounds per square inch) has been advocated for the distribution of gas in localities having a scattered population, and several distribution systems using this pressure have been installed and are now being operated In such systems wrought-iron pipe is used exclusively

Meters. The amount of gas supplied to each consumer is measured by means of consumers' meters, which are now of the dry type only A dry meter consists of a rectangular box, made of tin plate, divided into two main compartments by a horizontal partition The lower of these compartments is also divided into two equal parts by a vertical partition The measuring apparatus consists of two bellows, one in each of the divisions of the lower compartment, each formed by a circular metal disk, to the circumference of which is fastened one edge of a leather diaphragm having its other edge fastened to the central partition, the whole forming a gas-tight space The alternate opening and closing of these bellows by the pressure of the gas as it is admitted, first into the spaces inside and then into the spaces outside of them, furnishes motion which by suitable mechanism is made to operate valves controlling the flow of gas into and out of the bellows and outer spaces in such a way that gas cannot pass simultaneously into and out of any given space, and also to work the train of gears which records the amount of gas passed through the meter The mechanism also controls the extent to which the bellows can open and close, so that a fixed and definite volume of gas passes into and out of the meter each time one is filled and emptied The house pipes, which are usually wrought iron, should drain to the meter, where any condensation can be run off if necessary. A tolerance of 1 or 2 per cent fast or slow at time of the installation of a meter is usually considered sufficiently accurate, as the meter can be adjusted within 1 per cent of correct without difficulty. If the meter, after having been in service for several years, is accurate within 2 or 3 per cent, the loss to either customer or company is considered negligible Tests or retests are required by public-service authorities in many States, and the percentage of accuracy is being increased

Burners The principal forms of gas burners used for the development of light from the gas are the flat flame, the Argand, and the incandescent The flat-flame burners are either "batswing," in which the gas issues from a narrow slit cut through the rounded top of the tip, or "fishtail," in which the gas issues from two circular holes in a flat tip, inclined in such a way that the jets of gas strike against each other and are spread out in a sheet of flame The tips are usually made either of steatite or of a species of enamel Although in their early forms these two types produced flames of different shapes, whence their names, as now made they produce flames that are practically identical. The Argand burner is circular in form and consists of a hollow steatite or metal ring, the top of which is pierced with small holes, through which the gas issues Air, drawn in by the draft produced by a glass chimney, is supplied to both the inner and outer circumferences of the flame In the incandescent burner the gas is burned in an atmospheric burner giving a nonluminous flame, the heat of which is used to raise to incandescence a hood or mantle composed of oxides of rare earths, which are very refractory The mantles most commonly employed are composed of approximately 99 per cent of thoria and 1 per cent of ceria This combination has been found to yield the greatest amount of light, and the use of such mantles increases the amount of light obtainable from a foot of gas to four or five times what it can be made to yield in flat-flame or Argand burners As the amount of light that may be obtained from gas when burned in incandescent burners depends largely upon the calorific value, and but slightly upon the illuminating value, as shown by the legal method of testing (for which see PHOTOMETRY), the increasing use of these burners has given rise to a discussion of the advisability of changing from the old illuminating-value standards by which the quality has been judged to a calorific-value standard In some cities in Europe, where it is possible to make a gas of good calorific but low illuminating value much more cheaply than a gas with a higher illuminating value, the legal illuminating value has been reduced to 10 candles In London the legal standard of the gas companies has been reduced to 14 candles

Use of Illuminating Gas for Fuel Purposes During recent years there has been a large development of the use of gas for cooking, for such heating as is not required to be continuous, and for industrial purposes where it is important to have a high and easily controllable temperature A great number of gas companies have been very active in seeking for business along these lines, until in some cases the output of gas for fuel purposes is greater than that for illuminating purposes This development of the sale of gas for fuel also affords an argument in favor of the adoption of a calorific-value standard, as mentioned above

In 1912 the *Mineral Resources* of the United States Geological Survey reported that there had been sold for illuminating and fuel purposes 212,391,168,000 cubic feet, a figure which included a considerable decrease in the amount of gas used for illumination, but a great gain in its use for fuel

The total quantity of gas reported as sold in the United States for lighting and heating during the year 1910 according to the thirteenth census, was 156,900,000,000 cubic feet, as compared with 68,265,000,000 reported for 1900, an increase of 130 per cent Of the amount sold in 1909, about 15,791,220,000 was a by-product from the manufacture of coke and was sold to distributing companies for resale to consumers, the balance of the output was made by 1296 gas works, which number may be compared with 877 reported in 1899, 742 reported in 1889, and only 30 in 1850 The capital invested in the gas industry, according to the reports, increased from $6,674,000 in 1850 to $258,771,745 in 1889 $567,000,506 in 1899, and $915,536,762 in 1909 The total receipts for gas sold in 1909 were $138,615,309, or $0 92 per thousand cubic feet, which latter figure may be compared with $1 03 per thousand in 1899 and $1 42 per thousand in

1889 By-products sold in 1909, including tar, coke, and ammoniacal liquor (not separately reported), amounted to about $21,155,672, which, with $7,043,390 from rents and sales of appliances, brought the total revenues of the gas works up to $166,814,371 The total output of English gas works in 1910 was about 206,510,000,000 cubic feet

Sanitary Aspects. Towards the close of the nineteenth century the attention both of sanitarians and of those interested in gas manufacture was directed to the sanitary aspects of the use of illuminating gas The importance of this phase of the subject had recently been increased by the frequent substitution of water gas for coal gas In water gas the most poisonous agent—carbon monoxide—is increased, as compared with coal gas, from 6 or 7 per cent to about 30 per cent This change, however, was not necessary to make illuminating gas an active poison to breathe The danger in the use of illuminating gas arises from two sources (1) from unburned gas which escapes into the atmosphere through defective pipes or fixtures, or through burners accidentally open, and (2) from vitiation of the atmosphere through the products of burning gas

The National Board of Fire Underwriters has published a table of gas losses compiled from data furnished by 15 companies, which shows that over 14 per cent of the total product of gas plants leaks into the streets and houses of the cities supplied The danger to houses from escaping gas is much greater in the winter time, when the street surface is frozen, and when houses, on account of their higher temperature, act as chimneys to draw in the ground air, and with it the gas which has leaked into the soil Gas thus escaping may follow water or sewer pipes and enter even those houses which have no gas connections

In order to remove the constant menace to life and property, through explosion and asphyxiation, which is afforded by leaky gas mains, the whole matter should be under the strictest surveillance and control by the public The introduction in our large cities of subways for underground pipes and wires would remedy the evil by rendering gas mains easily accessible for constant inspection In this way the slightest leak would be detected The danger of deterioration of the mains through rust and of their breaking through settlement of the soil would also be removed

While the consumption of gas does vitiate the atmosphere of a room to a certain extent, an ideal system of ventilation is possible, in which burning gas is not a hindrance, but an essential part An example of such a system is the British Houses of Parliament, in which, by means of flues placed over the jets, the heat or surplus energy of the gas flame assists in producing a pure atmosphere A similar system of ventilation could be carried on in an ordinary room with a 13-foot ceiling, in conjunction with the chimney in the room, and the combustion of one cubic foot of gas could be made, by a suitable flue, to change the atmosphere of a room 15 × 15 × 11 feet once per hour In this event the three feet per hour consumed by an incandescent burner could be made abundantly to light and ventilate that space

For cases of isolated lighting, air gas, oil gas, and acetylene are chiefly used Among these the oldest method is air gas, popularly known as "Naphtha Gas," which consists of air charged with naphtha or gasoline vapor, a petroleum distillate consisting mainly of pentane, hexane, and heptane If the product is to be used exclusively for house lighting and heating, care must be taken that the mixture contains either less than 2 or more than 5 per cent of the hydrocarbon vapor, as it is between these figures that the mixture is explosive and only fit for use in the gasoline engine Many kinds of apparatus have been used for producing mixtures of the first type They consist essentially of a system for feeding measured quantities of air under slight pressure to a carburetor, or chamber, where the necessary amount of hydrocarbon is introduced in the form of a fine spray and regulated by a float operating a needle valve These carburetors are familiar in connection with the "gasoline engine" It is essential that the air used be at constant temperature and the vaporization be regular, otherwise the absorption of heat by too rapid evaporation yields a product low in illuminating and heating power With the use of gas mantles this difficulty has been partly obviated Where the mixture consists of more than 5 per cent vapor, it must be mixed with air before combustion Such mixtures are now used almost exclusively for heating purposes and are familiar in the painter's or brazier's torch and plumber's furnace Either piece of apparatus consists of a strong brass cylinder provided with an air pump or heating coil and a burner tube filled with fibrous material, the outer end of which terminates in a needle valve for controlling the supply of heated gas, and an air-mixing chamber Of the few types of apparatus of this order still used for house lighting, the simplest consist of a revolving air drum driven by weights and capable of forcing warm house air through a pipe to an underground tank, situated some distance from the building This pipe enters the top of the tank, bends at a right angle, and continues nearly to the bottom Another pipe for conveying the vapor-laden air leaves the top of the tank and returns to the building A supply pipe for gasoline extends just above the ground line and is closed except when the tank requires filling It is obvious that the house air, impelled by the drum, bubbles through the gasoline and becomes saturated with vapor Special burners, filled with fibre and provided with an air-mixing device, are necessary Many forms of air-gas machines are now operated by gasoline-engine power, the exhaust from which heats the air used in the operation, thus obtaining more constant results A simple form of apparatus of the pressure type is quite largely used in small household stoves and differs not materially from the plumber's furnace, except that the air pump is absent, and vaporization of pure hydrocarbon is maintained by heat, conducted back into the reservoir by the burner tube or a copper rod A small reservoir is provided under the burner By filling this with gasoline or alcohol and igniting, sufficient heat is generated in the reservoir by the time it has burned out to partly vaporize the hydrocarbon and produce enough pressure to cause a flow of hot vapor On opening the needle valve this vapor mixes with air and is burned at the tip of the burner The burner tube maintains sufficient heat in the reservoir as long as the flame is alight Kerosene may be burned in this

type of apparatus, which is familiarly known as the blue-flame stove The vapor of denatured alcohol is utilized in similar apparatus, but the practice has not found much favor in the United States Where light only is required, a mantle burner is employed

Oil Gas Illuminating mixtures made by the destructive distillation of oil or fats antedate coal gas, but failed from high cost of the original material With the production of cheap liquid hydrocarbons from various sources, the project revived and is now extensively employed either for enriching water gas or to be sold in a compressed form for isolated lighting—railway cars, boats, buoys, isolated dwellings, and street lamps

This gas is best known as "Pintsch gas" The process of manufacture is conducted in iron retorts and is similar to the coal-gas process, except that the maximum temperature rarely passes 900° F In the Young process the gas is washed by the oil flowing into the retort, and all condensible vapor removed

Oil gas has the following composition

CONSTITUENTS	Per cent
Unsaturated hydrocarbons	33 16
Saturated hydrocarbons	45 15
Hydrogen	19 65
Carbon monoxide	50
Carbon dioxide	50
Oxygen	60
Nitrogen	44

Oil gas is compressed in steel cylinders at 90–100 pounds' pressure and when used must be attached to a special governor for reducing the pressure to 1–2 inches of water Special flat-flame or ordinary mantle burners are used

Blau Gas, invented by Hermann Blau, of Augsburg, is a special form of oil gas consisting of propane, butane, and pentanes with hydrogen and methane in solution under pressure It has a higher illuminating and heating power than ordinary oil gas and is particularly recommended on account of its safety for use in dwellings, lighthouses, etc Very high temperatures are obtained by burning the gas in combination with oxygen In this manner it is used in burning steel beams in the demolition of buildings, ships, and similar structures

Acetylene, C_2H_2, is produced by adding water to calcium carbide, or vice versa The gas is pure, requiring no further treatment, and the operation of making may be stopped at will As the gas is generated under pressure, a strong well-made apparatus is necessary, and there is always the element of danger from excessive pressure This form of lighting has been very popular, especially on a small scale, as in bicycle and automobile lamps, etc The danger factor has led to the manufacture of the gas and storage under pressure in strong steel tanks filled with fibre and containing acetone, which dissolves the gas under pressure and releases it on removal The high cost of this system limits its application for general use Acetylene and oxygen, both under pressure, are extensively used in producing high temperatures for metal work, acetylene welding, and brazing It is claimed that acetylene penetrates fog or mist better than the electric light, hence should receive the preference for buoys, ships, and railway signals Acetylene burns best in the Y-shaped burner. The apertures are on the inside of the Y arms near the top The two opposing streams of gas impinging spread out in fan-shape flame Acetylene is less poisonous than any other illuminating gas and if it escapes in any quantity may be recognized by its characteristic odor See ACETYLENE

Natural Gas issues from the earth in many localities and has been known from a very early date As far back as history goes the "eternal fires of Baku" on the Caspian Sea are mentioned, and it is quite likely that a gas well existed in the temple of Diana at Ephesus No application was made of this valuable product until recent times Wherever soft coal or oil occurs, the deposits are more or less accompanied by gas This fact has led to the belief that "natural gas" is one of the by-products in the formation of coal With the exploitation of petroleum in the United States vast supplies of gas were accidentally tapped and many hundred million feet wasted before the excessive pressure of the wells could be brought under control When means were devised for accomplishing this end, the product was piped many miles in some cases and utilized for heating and lighting on a large scale

Natural gas consists largely of hydrogen and methane, consequently has low illuminating and high heating capacity It is, moreover, frequently highly charged with impurities such as hydrogen sulphide, etc, and requires purification before it is suitable for house use As there is no absolute certainty of the duration of the supply, any but the simplest means of handling and purification are usually out of the question Natural gas is still very largely used for metallurgical purposes and street lighting See GAS, NATURAL

Bibliography Journals devoted to the subject of the manufacture and distribution of gas appear in all the leading languages, and of these the *Journal of Gas Lighting* (London) was first issued in 1849 Other journals of importance are the *American Gaslight Journal* (New York) and the *Gas Age* (ib) For a full description of the subject of gas lighting, consult Thorpe, *Dictionary of Applied Chemistry* (London, 1912), Newbigging, *Handbook for Gas Engineers* (ib, 1904), Lewes, *Carbonisation of Coal* (ib, 1912), O'Connor, *Gas Manufacture and Lighting* (ib, 1910), Bertelsmann, "Das Leuchtgas in den Stadten," in Weyl's *Handbuch der Hygiene* (Leipzig, 1913), Strache, *Gas Beleuchtung und Gasindustrie* (Brunswick, 1913), *Legal Specifications for Illuminating Gas*, United States Bureau of Standards, Technologic Papers No 14 (Government Printing Office, Washington, 1913), Hunt, *History of the Introduction of Gas Lighting* (London, 1907), Butterfield, *The Chemistry of Gas Manufacture* (ib, 1907), id, *Lectures on Chemistry in Gas Works* (ib, 1913)

See PUBLIC UTILITIES for discussion of organization and control of gas companies

GAS, LAUGHING See ANÆSTHETIC; NITROGEN

GAS, NATURAL A gaseous member of the paraffin series (see HYDROCARBONS), petroleum (q.v) being a liquid member and asphalt (q v) a solid one

Composition Natural gas is made up chiefly of marsh gas, or methane (CH_4), which usually forms over 90 per cent of the entire gas, the extremes of a number of analyses of United States samples being 98 30 (Ala) and 14.33

(Dexter, Kans). In this same series carbon dioxide ranges from 0 05 to 30 40 per cent, nitrogen from 82 70 to 0 60 per cent, and oxygen from a trace to 9 per cent Other hydrocarbons are usually present in small amounts, but range from a few tenths per cent up to 20 or 30 per cent in exceptional cases The rare element neon as well as helium has been found in Kansas gas The accompanying analyses give the composition of natural gas from different American localities

arrange themselves according to their specific gravities, the gas and oil being found at and near the crest, respectively, while on either flank there is often an abundance of water At times little or no oil may be present

This theory of gas accumulation is known as the "anticlinal theory" and was developed by Profs E Orton and I C White The structure of the rocks at the surface is not necessarily the same as that of the oil-bearing formation, since the two series may not be conformable It has

NATURAL GASES	1	2	3	4	5	6	7
Methane (CH_4)	96 20	14 85	62 93	73 81	92 61	80 94	86 48
Ethane (C_2H_6)	78	41				14 60	7 65
Olefine (C_2H_4)	00				30		
Carbon dioxide (CO_2)	00	00	50	81	26		
Carbon monoxide (CO)	11	00	tr		50	40	50
Oxygen (O)	tr	20	70	3 46	34	20	30
Nitrogen (N)	2 46	82 70	24 36	21 92	3 61	3 46	4 87
Hydrogen (H)	18	tr	11 51		2 18	tr	
Helium (He)	27	1 84	undet	undet	undet	undet	undet
Hydrogen sulphide (H_2S)	00				20		

1 Buffalo, Kans , 2 Dexter, Kans , 3 Stockton, Cal , 4 Pittsfield, Ill , 5 Findlay, Ohio, 6 Big Injun Sand, Shinnston, W Va , 7 Fifty Foot Sand, same locality

Natural gas has a specific gravity of 0 6 to 0 65, it weighs from 47 to 49 pounds per 1000 cubic feet and has a calorific power ranging from about 920,000 to 1,250,000 B T U per 1000 cubic feet

Mode of Occurrence Gas, as a rule, is found only in sedimentary formations, unbroken by faults and but little folded or otherwise disturbed. Exception to this is the occurrence of gas with salt domes in Louisiana and with faulted beds in California The conditions favorable for accumulation are a porous rock to serve as a reservoir, a cap rock to hold it, and the proper structure to encourage concentration. The reservoir rock is generally sandstone, but sand, limestone, dolomite, and more rarely shale, may serve the same function Natural gas is found in rocks of all geological ages and is often more or less closely associated with petroleum The following classification, suggested by Clapp, indicates the types of structure with which gas may be associated

I Where anticlinal structure exists
  (a) Strong anticlines standing alone
  (b) Well-defined anticlines alternating with synclines
  (c) Structural terraces
  (d) Accumulations on monoclines due to thinning out or change in texture of the sand as it rises towards the nearest anticline
  (e) Broad geanticlinal folds
II Quaquaversal structures
  (a) Anticlinal bulges
  (b) Stratigraphic domes
  (c) Saline domes.
III Contact of sedimentary and crystalline rocks
IV In joint cracks
V Where there is no particular gas structure, but the gas is associated with adjacent oil pools

While all these types of occurrence are known in the United States, the most common one is the association of the gas with some sort of anticlinal structure Where this is true, and oil and saline water are associated with the gas, there will be a tendency for the three to

been noticed in many gas fields that when the reservoir is tapped the gas usually rushes out as though under great pressure, this being spoken of as rock pressure Prof E Orton believed that this pressure was hydrostatic and due to the head of water in the rocks overlying the gas, the amount of pressure in the Ohio field being equal to a column of water whose height was equal to the elevation of Lake Erie above the gas-bearing stratum While this theory may hold in some cases, still I C White has pointed out that in others the rock pressure is much greater than the artesian pressure in the same region, and furthermore that the exhaustion of the gas is not always followed by a flow of water In such cases the rock pressure must be due to the expansive force of the gas The original rock pressure varies in different fields and is not infrequently as high as 300 or 400 pounds per square inch at the mouth of the well and in some wells may exceed 1000 pounds per square inch Several of the newer wells in West Virginia having a depth of from 2700 to 3200 feet showed a rock pressure ranging from 1000 pounds to 1300 pounds per square inch A decrease in pressure is always likely to follow with time, as in the case of the first well opened at Findlay, Ohio, where the pressure fell from 450 pounds in 1886 to 170 pounds in 1890 In the early days of gas-well drilling the supply appeared so inexhaustible that the newly drilled wells were often allowed to blow off gas for several days or weeks before attempts were made to cap them

Origin. Many theories have been advanced to explain the origin of natural gas, but they all fall into one of two groups, the inorganic and the organic Those belonging to the former class usually assume that surface water has penetrated to the earth's interior, where it has acted chemically on carbide of iron at high temperature, producing hydrocarbons, or in other cases the natural gas is supposed to be a volcanic exhalation The organic theories agree in believing the gas to have originated by the decomposition of organic matter buried in the rocks, but the points of difference shown by the advocates of this theory are whether the

gas has originated in situ or migrated from other formations, and whether it has been derived from animal or vegetable matter

Distribution. The natural gas fields of the United States, together with their estimated areas, are as follows

	Sq mi		Sq mi
Pennsylvania	2730	Arkansas	100
Indiana	2460	Colorado	80
West Virginia	1000	South Dakota	80
New York	550	Missouri	70
Oklahoma	1000	Washington	70
California	310	Illinois	50
Kentucky	290	Michigan	40
Ohio	275	Montana	40
Kansas	550	Utah	40
Texas	130	Alabama	40
Wyoming	120	Oregon	20
Louisiana	110		10,155

The areas of gas production and oil production correspond more or less geologically and geographically, but there are comparatively few important gas-producing regions These are (1) Appalachian region, including the fields of New York, Pennsylvania, southeastern Ohio, West Virginia, Kentucky, and Alabama, (2) Trenton rock region, or Ohio-Indiana field, (3) Clinton sand region, or central Ohio field, (4) Mid-Continent or Kansas-Oklahoma field; (5) Caddo field of northwestern Louisiana

In the Appalachian field, which extends from New York to Alabama, the gas occurs in formations ranging from the Ordovician to Carboniferous, but in the central part the wells do not penetrate deeper than the Devonian No less than 30 gas sands are known in the Devonian and Carboniferous, and in West Virginia some producing wells reach a depth of 4000 feet The Trenton rock region extends from northwestern Ohio into Indiana and is associated with a broad dome known as the Cincinnati anticline This field is decreasing in output The Clinton sand field extends from western Ontario southward nearly to the Ohio River, the large gas fields being found in the highest portion of the Clinton (Silurian) sand.

In the Kansas-Oklahoma field the gas is all obtained from carboniferous sandstones except an area in southern Oklahoma which yields Cretaceous gas The structure is of the anticlinal type or a modification of it The Caddo field of northwestern Louisiana is associated with the Sabine uplift, which is a broad anticline, carrying gas in the Cretaceous and Tertiary sandstones

Mining and Uses. The methods used for drilling gas wells are the same as those employed for sinking oil wells When the gas is first struck, the pressure has in rare cases been sufficiently great to blow out the string of drilling tools weighing over 1000 pounds As soon as practicable the well is capped, and the supply is piped to the site of consumption or to storage tanks. As the gas is often required for use at some distance from the well, the construction of pipe lines has become an important feature of the natural-gas industry With high rock pressure the gas may reach the market unaided, but with low pressure it is necessary to locate pumping stations at different points along the pipe The pipes used vary in diameter from 2 inches to 3 feet and are made of wrought iron or steel One of the first lines was that laid in 1882 from Wilcox to Colegrove, Pa, a distance of 20 miles Later, with the depletion of the gas fields around Pittsburgh, it became necessary to pipe the gas for that city from greater distances, and at the present time some of it is being piped from Doddridge Co, W. Va, a distance of over 100 miles The pipe lines from Wetzel Co, W Va, to Akron and Canton, Ohio, are over 150 miles long

When first used, the price of natural gas was low and no attempt was made to measure it, as it appeared to be widely distributed and to exist in inexhaustible quantities, but the giving out of some of the districts and the rapid fall in rock pressure led to the use of meters and a rise in the value of the gas On account of its cleanliness and excellent calorific power, natural gas has become an important source of light, heat, and power in many States, so that in 1912 it was supplied in 23 States to a total of 15,936 manufacturing establishments, including iron mills, steelworks, glass factories, brick factories, and lead and zinc smelters In addition to this it was used in many hundred private houses for heating or illumination

There has been considerable agitation in recent years against a reckless waste of natural gas The causes of this waste are (1) free escape from natural-gas wells that have not been closed, (2) free escape of gas from oil wells, (3) abuse of gas by the use of its pressure to drive engines, (4) jetting of gas into oil wells for purpose of gas lift instead of air lift, (5) wasteful installation of gas burners and lights in oil-well drilling, (6) waste by selling at a flat rate, (7) waste from inefficient furnaces

The consumption of natural gas in the United States in 1912 was 562,203,452,000 cubic feet, valued at $84,563,957, an average price of 15 04 cents per thousand cubic feet There were 30,779 producing wells at the end of 1912

An interesting recent development is the separation of the more volatile grades of gasoline from natural gas issuing from oil wells, the gas from various regions yielding from 0 to 8 or 10 gallons of gasoline per thousand feet, with an average of 3 gallons The total quantity of gasoline so produced in 1912 was 12,081,179 gallons, valued at $1,157,476

History The use of natural gas in China and Persia is said to date back to a very remote period In the United States General Washington is said to have visited a burning spring on the Great Kanawha River, near the present site of Charleston, W Va, but the first recorded use of natural gas in this country was in 1821 at Fredonia, N Y, where it was piped from a well for illuminating purposes In 1841 it was used in the Great Kanawha valley for heating salt furnaces, but its extensive use did not begin until 1872, at Fairview, Pa In 1875 it was first used for iron smelting at Etna Borough, near Pittsburgh, and in 1886 was brought to Pittsburgh from the Haymaker well near Murraysville, 19 miles distant Since then its use has steadily increased

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GAS CITY A city in Grant Co, Ind, 45 miles southeast of Logansport, on the Pittsburgh, Cincinnati, Chicago, and St Louis Railroad (Map· Indiana, F 4) The city contains a Carnegie library It is in an agricultural region and has tin-plate works and glass factories, bottling works, and manufactories of paper boxes, rubber goods, gloves, and lumber Under a charter of 1896 its government consists of a mayor and a unicameral council The water works and electric-light plant are owned by the city Pop, 1900, 3662, 1910, 3224

GASCOIGNE, găs-koin′, GEORGE (c 1535–77) An English poet He was born about 1535, the son of Sir John Gascoigne, of Cardington, Bedfordshire, and was educated at Trinity College, Cambridge, but left without a degree, entering, it is said, the Middle Temple before 1548 In 1555 he became a student of Gray's Inn, in 1557–59 he was member of Parliament; about 1566 he married and settled at Walthamstow. To escape his numerous creditors he went to Holland in 1572, where he served with distinction under William, Prince of Orange, but was captured by the Spaniards under the walls of Leyden and sent back to England after an imprisonment of four months His *Posies of G. Gascoigne* appeared in 1575 In the same year he accompanied Queen Elizabeth on her memorable visit to Kenilworth, and was commissioned by Leicester to write verses and masques for her entertainment These appeared in *The Princelye Pleasures* (1576) Gascoigne is best known by his lyrics, such as "The Arraignment of a Lover" and "A Strange Passion of a Lover" But much of his other work is of very great historical interest *The Supposes*, acted at Gray's Inn in 1566, an adaptation of Ariosto's *Gli suppositi*, is the earliest extant comedy in English prose Aided by Francis Kinwelmersh, he wrote *Jocasta* (1575), a free rendering of Euripides' *Phœnissæ* This is the second earliest English tragedy in blank verse *The Steel Glas* (1576), written in blank verse, is our earliest regular verse satire *Certayne Notes of Instruction Concerning the Making of Verse or Ryme in English* (1575) is the earliest English critical essay An edition of Gascoigne's *Works* was published by Jeffes (London, 1587) His *Complete Poems* were edited by W C Hazlitt, Roxburghe Library (London, 1868–69) His principal poems were edited by Arber (London, 1868), and his *Complete Works*, ed by John W Cunliffe, appeared in the *Cambridge English Classics* (New York, 1907–10) Consult F E Schelling, *Life and Writings of George Gascoigne* (Philadelphia, 1893), and Sidney Lee's article in *Dictionary of National Biography* (London, 1889)

GASCOIGNE, SIR WILLIAM (c 1350–1419) An English judge during the reign of Henry IV and the first English judge of whom we have any personal anecdotes He was made a sergeant at law in 1397 and in 1400 became Chief Justice of the King's Bench In this high office he distinguished himself both by his integrity and ability In July, 1403, he was joined with the Earl of Westmoreland in a commission for levying forces against the insurrection of Henry ("Hotspur") Percy In popular, though unauthenticated, story he is chiefly celebrated for the fearlessness with which he defended the immunities of his judicial office from interference by the court On one occasion, the legend runs, when one of the dissolute companions of young Prince Henry, afterward Henry V, was arraigned before Gascoigne for felony, the Prince demanded his release and, on being ordered out of the court room, rushed upon the judge and struck him Gascoigne immediately committed the Prince to prison, and Henry, so the story goes, conscience-stricken, submitted The King, on being informed of the occurrence, is said to have thanked God for having given him "both a judge who knew how to administer the laws and a son who respected their authority" Shakespeare, in *Henry IV, Part II*, represents the young Henry V as bidding Gascoigne retain, under a new king, the office whose honor he knew so well how to defend Historically this is untrue, as Gascoigne seems to have resigned immediately after Henry V's accession Consult Foss, *Biographia Juridica* (Boston, 1870); Campbell, *Lives of the Chief Justices* (London, 1874), Oman, *History of England from Accession of Richard II to Death of Richard III, 1377–1485* (ib, 1906)

GAS′CON A fish See SAUREL

GASCON, ga′skŏn′, **GASCONNADE,** ga′skŏ′nad′ Terms employed to denote respectively a boaster or braggart and any extravagant boast or vaunting The inhabitants of the district once known as Gascony have long been, and are still, regarded as notorious braggarts

GASCONADE (găs′kŏn-ād′) **RIVER** A right tributary of the Missouri, rising in the Ozark Mountains, in Wright Co, Mo (Map· Missouri, E 3) It flows north-northeast and empties into the Missouri at Gasconade after a course of about 300 miles Its principal tributaries are the Prairie Fork, Osage Fork, Robidoux Creek, and Big and Little Piney The stream is navigable for vessels of light draft to Arlington, 107 miles above its mouth, and is an important medium of commerce and transportation throughout this distance

GAS′CONY (Fr *Gascogne*, Lat *Vasconia*, from *Vascones*, the Basques) An ancient duchy in the southwest of France Its boundaries were normally the Bay of Biscay, the river Garonne, and the western Pyrenees The modern departments of Landes, Gers, Basses-Pyrénées, Hautes-Pyrénées, and the southern portions of Haute-Garonne, Tarn-et-Garonne, and Lot-et-Garonne are embraced within its ancient boundaries It derived its name from the Basques, or Vasques,

who, driven by the Visigoths from their own territories on the southern slope of the western Pyrenees, crossed to the northern side of that mountain range in the middle of the sixth century and settled in the former Roman District of Aquitania Tertia, or Novempopulana In 602, after an obstinate resistance, the Basques were forced to submit to the Franks They passed under the sovereignty of the dukes of Aquitania, who for a time were independent of the crown, but were afterward conquered by Pepin and later by Charles the Great Subsequently the district became incorporated with Aquitania (q v) Consult Monlezun, *Histoire de la Gascoigne* (6 vols, Auch, 1846–50), Jaurgain, *La Vasconie, étude historique et critique* (2 vols, Paris, 1898–1902), Lot, *Etudes sur le règne de Hugues Capet* (ib, 1903), Marsh, *English Rule in Gascony, 1199–1259* (Ann Arbor, 1912)

GASCOYNE-CECIL See SALISBURY, third MARQUIS OF

GAS ENGINE A form of prime mover which renders available the energy released in the form of heat when a combustion takes place under the following conditions (1) when such combustion takes place within the motor cylinder itself, (2) when the fuel elements enter the cylinder in the form of gas The pressure developed by heating the air supplied for proper combustion and the products of such combustion in a confined space is exerted directly to drive the piston A better and more inclusive term to meet requirement (1) is the title *internal-combustion engine* (q v), because the combustion is internal to the cylinder, instead of external as in the *hot-air engine* (q v) or in the *steam engine* (q v), which has a *steam boiler* externally heated, and in many cases the operation and functioning of the motor will be identical if the fuel is supplied under the second requirement mentioned above, in liquid form, and made into a fog or mist or a true vapor by an atomizing process Such fuel fog behaves exactly like a gas when the division is fine enough A true gas is supplied to an internal-combustion motor only in very large installations, where it will pay to make the gas in a producer or gas-making plant, and near the iron-making blast furnace, where a fuel gas is a by-product of the plant and process, or in districts where natural gas is available (See FUEL) The construction, functioning, and uses of the internal-combustion motor, whether using gas or an atomized liquid fuel, will be discussed under INTERNAL-COMBUSTION ENGINE

Historical Development In 1678 the Abbé d'Hautefeuille invented an engine for employing the explosive power of gunpowder to drive a piston working in a cylinder. This was the prototype of the modern gas engine In 1680 the eminent Dutch physicist, Christian Huygens, devised a similar gunpowder engine The next development of the internal-combustion engine was in 1791, when John Barber, an Englishman, specified in a patent the use of a mixture of a hydrocarbon gas and air and its explosion in a vessel, which he called an exploder Some years later John Street, also an Englishman, took out a patent for the production of an explosive vapor by means of a liquid and air, ignited by a flame, in a suitable cylinder so as to drive machinery In 1799 Philip Lebon, a Frenchman, took out a patent describing the construction and principle of operation of an engine using coal gas as the fuel, and two years later he secured a second patent on an improved form of the same engine. Several other inventors followed Lebon, but nothing practical was devised until 1860

In 1860 Lenoir, a Frenchman, invented the first practical gas engine. This engine resembled in external appearance a single-cylinder, horizontal steam engine and was double acting Gas was drawn into the cylinder during the first half of the forward stroke and exploded by an electric spark from a Ruhmkorff coil when the piston was commencing the second half of the forward stroke The burnt gases were forced out during the return stroke, at which time an explosion was taking place on the other side of the piston The cylinder was water-jacketed and the engine ran smoothly and regularly, thus raising high hopes that a successful substitute for the steam engine had been found As the charge was exploded without its being compressed, the engine was very wasteful in its consumption of gas Because of this and other defects, it soon went out of use

The principal good accomplished by Lenoir's work was to attract attention to the gas engine As a result of this, in 1862, M Beau de Rochas took out a patent for the working principles of an internal-combustion motor which were set forth as follows During the forward stroke of the piston the explosive mixture was to be drawn into the cylinder, and during the return stroke this volume of gas was to be compressed, at the beginning of the second forward stroke the combustion was to take place, driving the piston forward, the burnt gases to be expelled during the second return stroke As will be observed, the invention called for an engine with a cycle of four distinct operations for each impulse No engine was built by Beau de Rochas, and for 16 years the existence of his invention remained practically unnoticed Meanwhile, in 1867, two Germans, Otto and Langen, patented an engine in which the explosion of gases in the cylinder served to impel a free piston so that the volume behind it at the end of its traverse was not filled by the volume of the gases at atmospheric pressure Hence there was a partial vacuum under the piston, which was therefore forced down by the atmospheric pressure above it Although very crude mechanically, this engine consumed only about one-half the gas consumed by the Lenoir engine and was the first atmospheric engine to attain commercial importance

In 1878 Dr Otto brought out his gas engine, in which he reinvented the Beau de Rochas cycle and applied it in the construction of an actual engine In this engine the cylinder was continued back beyond the stroke of the piston to form a compression chamber, and the mixture, or charge, was compressed to a pressure of from 45 to 60 pounds per square inch The ignition was effected by a flame being brought into contact with the compressed mixture, and this produced a pressure of about 150 pounds per square inch, with a temperature of about 1500° Centigrade The cycle was identical with that of Beau de Rochas, but, to increase the efficiency and to simplify practical working, Otto permitted the dilution of the fresh charge by a portion of the burnt gases from the previous stroke This made the gases burn more slowly and caused a less violent explosion As the piston received an impulse only once in every four strokes, or every two revolutions,

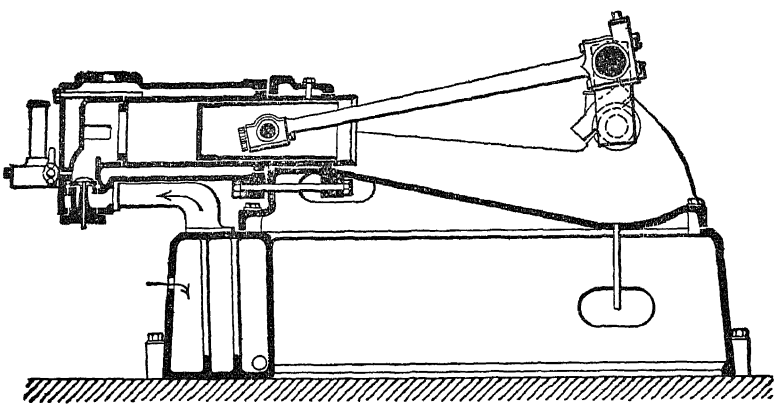
regularity of motion had to be secured by heavy fly wheels Overheating of the cylinder was prevented by a water jacket Otto's engine consumed only about 915 liters of gas per horse power per hour as compared with 1380 liters consumed by the Otto and Langen engine and 2700 liters by the Lenoir engine

Many inventors tried to make a gas engine which gave an impulse every two strokes, or once in each revolution, and among them Dugald-Clerk was the first to be successful He built an engine having two cylinders of equal diameter placed side by side, of which one was the power cylinder in which the explosion took place, the other being used to draw in and to compress the charge and also to furnish a blast of fresh air to clear out the power cylinder after the explosion This engine could be run with lighter flywheels than the Otto, because of the impulse at every revolution, but owing to high dilution with burnt gases from a previous stroke, it was less efficient Engines of the Clerk principle are called "two-cycle," or more properly "two-stroke cycle," engines and will be discussed under INTERNAL-COMBUSTION ENGINE

suction producer The latter has the advantages that the draft, being dependent on the engine, automatically controls the fire, and, the gas pressure being below atmospheric, there is no tendency for it to leak out This is important because the gas is poisonous On account of the large saving in the cost of power, producer-gas engines are being used extensively A light form of producer has been used with a gas engine to propel a vessel, but the majority of boats driven by internal combustion motors use liquid fuel, either as gasoline, or, in the case of the larger vessels, the heavier oils, such as crude petroleum or distillate See INTERNAL-COMBUSTION ENGINE, where bibliography is given

GAS'ES, ANALYSIS OF See ANALYSIS, CHEMICAL

GASES, GENERAL PROPERTIES OF The study of the nature and properties of gases has yielded many of the most important results of modern science Practically the entire structure of modern chemistry rests on our knowledge of gases The birth of the science, as already explained in the article CHEMISTRY, followed almost immediately the discovery of the common

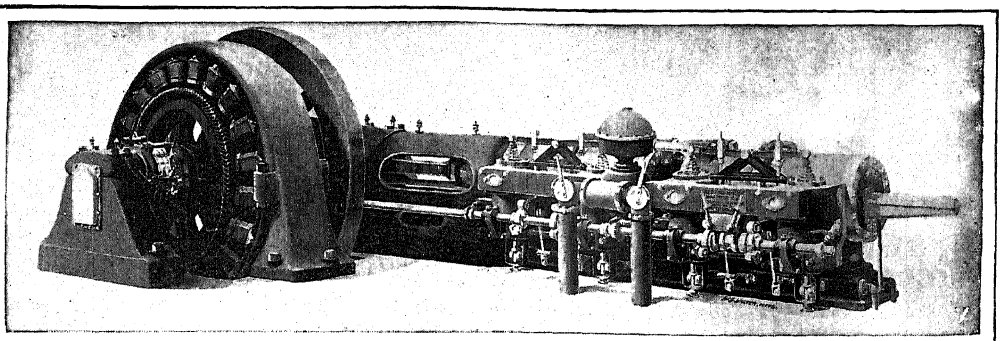


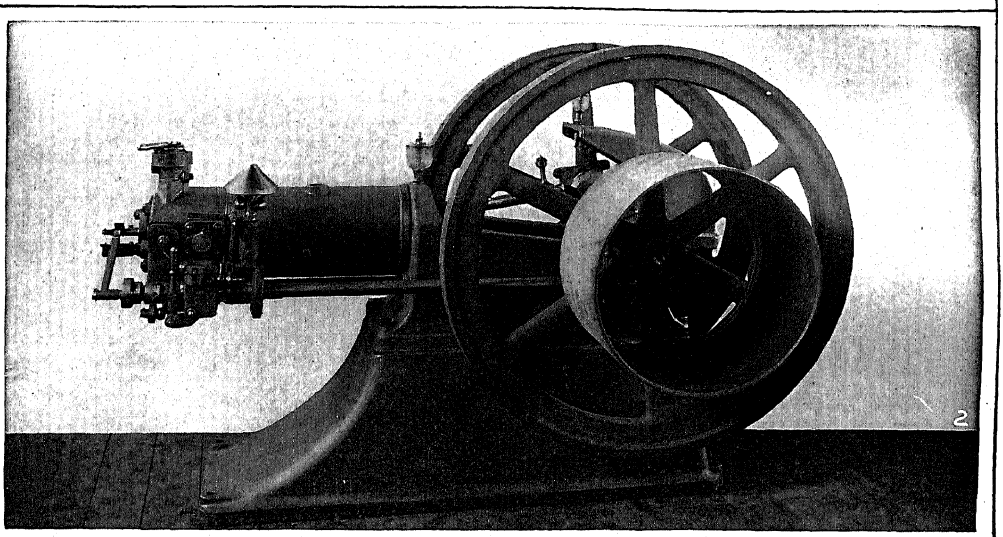
LONGITUDINAL SECTION OF OTTO-CROSSLEY GAS ENGINE

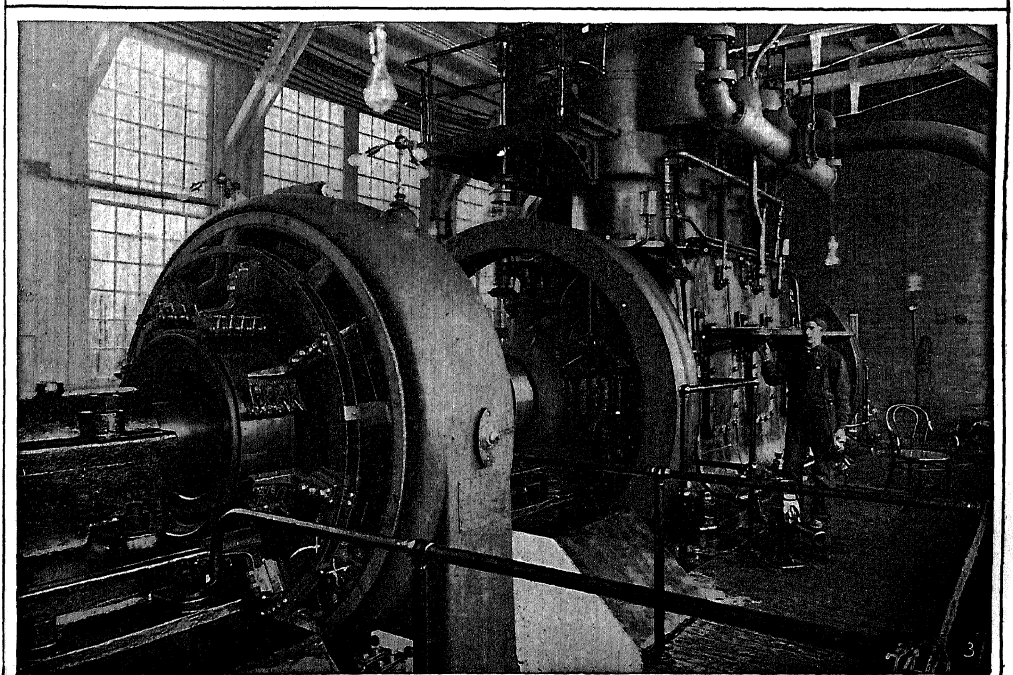
Gas engines using illuminating gas from the mains of cities and towns will usually be very small on account of the cost of fuel so distributed, but in certain high-pressure pumping stations, as in Philadelphia, they have been found very serviceable for fire purposes, being available instantly and responding at once, so that the independent fire mains may be put under pressure Of course here with infrequent use cost is a secondary consideration, even for a large station.

Producer Gas Engines. The greatest recent advance in true gas engine practice has been the development of engines using producer gas (See FUEL) By this method it is comparatively easy to get a horse-power hour per pound of anthracite coal, and during tests some of these engines have produced a horse-power hour on about three-quarters of a pound of anthracite coal Another decided advantage is that the small sizes of anthracite coal, which are the cheapest, can be used in a gas producer The producer may be operated on either of two systems In one a blower is used to furnish a draft for the fire, thus putting the gas under pressure, this is called a pressure producer In the other system the suction of the engine furnishes the draft, the pressure of the gas being consequently less than atmospheric, this is a

gases The fruitful theories of modern organic chemistry are based entirely on the general properties of gases, and in the latter part of the nineteenth century general theoretical chemistry received a powerful impulse by the extension of the laws of gases to dilute solutions (See SOLUTION) On the other hand, the physicist has been led, by the study of gases, to a clear and simple explanation of the phenomena of heat and of many other general phenomena forming important chapters in modern physics And, of course, through chemistry and physics the applied and natural sciences, too, owe a great deal to our knowledge of gases All this importance of gases is due to the comparative simplicity of the laws followed by them The simplicity of the laws is, in turn, readily explained from the standpoint of the molecular conception Molecules are minute particles of matter When they are very near to one another, there must naturally come into play between them forces whose effects are practically nothing when the molecules are widely separated Under ordinary pressures a substance occupies a much greater volume in the gaseous than in the liquid or solid state Thus, an amount of water occupying, at 0° C., one cubic centimeter if liquid, would, if vaporized at the same temperature and under ordinary atmos-







1. WESTINGHOUSE SINGLE CRANK HORIZONTAL DOUBLE-ACTING GAS-ENGINE.
2. OTTO GAS-ENGINE.
3. WESTINGHOUSE 3-CYLINDER VERTICAL GAS-ENGINE Operating Direct Current Engine Type Generator.

pheric pressure, occupy over 773 cubic centimeters Evidently the molecules of a gaseous substance must be very far apart, and their mutual influence very slight In other words, the number of causes determining the properties of gases must be smaller, and hence the properties themselves must be less complex, than those of liquids or solids Of course, as the volume within which a gas is compressed is made smaller and smaller, the relative simplicity of properties gradually disappears (See MOLECULES—MOLECULAR WEIGHTS) Under certain conditions of pressure and temperature the properties of a substance in the gaseous and liquid states even become identical (See CRITICAL POINT) This shows that simplicity of properties, while generally found in the gaseous state, is not strictly characteristic of it Other characteristics may be found mentioned under AGGREGATION, STATES OF

It is explained in the articles on HYDROSTATICS and HYDRODYNAMICS how liquids and gases have certain properties in common, viz, all those which depend upon fluid pressure, which is defined as the force per unit area It is shown in those articles

1. The pressure at any point in a gas is the same in all directions, and its value is $\rho gh + P$, where ρ is the average density of the gas above the point, g is the acceleration due to gravity of a freely falling body, h is the vertical distance from the point to the top of the gas (if it is inclosed in a reservoir), and P is a pressure uniform throughout the gas, due to the reaction of the walls of the reservoir against the outward expansive force of the gas In all ordinary cases of gases h is not large, and so ρgh may be neglected, because ρ is extremely small, and P is the principal term In the case of the atmosphere, however, P is zero and h large

2 The pressure of the gas against the containing walls or against any solid immersed in it is perpendicular to the solid, if the gas is not flowing

3 Archimides' principle applies to gases, viz, if a solid or a drop of liquid is immersed in the gas, it is buoyed up with a force equal to the weight of the displaced gas

4 If a gas escapes from a reservoir through a small opening in a thin wall, its velocity of "efflux" is given by the formula $v = \sqrt{\frac{2p}{\rho}}$, where p is the difference in pressure of the gas inside the reservoir and outside (This is not the *total* pressure, but the partial pressure due to this particular gas See *Dalton's Law*, below)

5. If a gas is flowing steadily but slowly through a tube of irregular cross section, the pressure is greatest where the velocity is least, and vice versa. This is the principle of the "atomizer," the "injector" for steam boilers, etc

The densities of gases at 0° C and standard pressure are as follows air, 0 001293, carbon dioxide, 0 001974, hydrogen, 0 0000896, oxygen, 0 001430 The special properties of gases have been stated in the form of laws.

Dalton's Law If several gases are contained in the same reservoir, they are distributed uniformly through it, so that the mixture is everywhere the same, and the total pressure on the walls is the sum of the partial pressures, by "partial" pressure is meant that pressure which each gas by itself would exert on the walls if the other gases were removed. This law of pressures has been shown recently to be not perfectly exact

Boyle's Law If the temperature of a gas is kept constant, and its volume changes, the resulting pressure and density are such that one is proportional to the other In symbols, $p = k\rho$, or writing $\frac{m}{v}$ for ρ, $pv = km$, where m is the mass and v is the volume This law, too, is only approximate, for as the pressure on the gas is increased, the product pv does not remain a constant quantity, but first decreases and then increases (For hydrogen gas the product pv increases without any preliminary decrease) This means that at high pressures gases are less compressible than they would be if Boyle's law were obeyed exactly This law, $pv =$ constant at constant temperatures, was first stated by Robert Boyle in 1662 as the result of careful experiments on air, 14 years afterward it was published by Mariotte

It is a consequence of Boyle's law that the elasticity of a gas at constant temperature numerically equals the pressure If a gas is compressed rapidly, its temperature rises, and so the pressure is increased, the elasticity for a sudden compression or rarefaction equals γp, where γ is the ratio of the two specific heats for the gas and for ordinary gases has the value 1 4 (See ELASTICITY) An instrument for measuring high pressures in a fluid is made, called a closed "manometer," the principle of which depends upon Boyle's law It consists of a device to trap a definite mass of gas in a closed tube by means of some liquid, such as mercury, and to have the column of mercury compress the gas as the pressure to be measured is increased, the volume of the gas varies inversely as the pressure on it

If a gas is allowed to expand freely, doing no external work—e g , take two reservoirs connected by a tube with a stopcock, compress the gas in one and rarefy it in the other, then let the stopcock be opened—it is observed that there is practically no energy required to produce the expansion This shows that any forces of attraction between the molecules must be extremely small (See HEAT) It is found by experiment that if the pressure on a gas is kept constant, but the temperature changed, the volume changes at the rate given by the formula

$$v = v_0(1 + \beta t),$$

where v is the volume at $t°$ C , v_0, that at 0°; β is a constant, the *same for all gases* approximately Similarly, if the volume is kept constant, and the temperature changed, the pressure will change according to the law

$$p = p_0(1 + \beta t),$$

where p is the pressure at $t°$ C , p_0, that at 0° β is a constant, the same for all gases and *the same as in the above formula* for the change of volume The value of this "coefficient of expansion" is almost exactly $\frac{1}{273}$ or 0 003662 This law for the change in pressure or volume of a gas as the temperature is altered, viz, that β is the same for all gases, was discovered almost simultaneously by Charles, Dalton, and Gay-Lussac

Another law, known as the "law of combining volumes," may be found explained under CHEMISTRY

The experimental laws for gases may be deduced theoretically for a mechanical system of perfectly elastic spheres thrown at random into

a space bounded by rigid walls If the number of spheres is great enough to allow the application of the principle of statistics, it can be shown that the pressure on the walls owing to the impact of the spheres is $p = \frac{1}{3} mnu^2$, where m is the mass of each sphere, n is the number of spheres per cubic centimeter, u^2 is the mean value of the squared velocities of the spheres The density is then mn, and the formula may be written $p = \frac{1}{3}\rho u^2$

It may also be shown that the mean kinetic energy of translation of the spheres—$\frac{1}{2} mu^2$—has properties identical with those of the temperature of a gas, consequently the above value of the pressure satisfies Boyle's law The law for the expansion with temperature may also be derived, viz that β is the same for all gases

Again, if there are several sets of spheres inclosed in the same space,

$$p = \tfrac{1}{3}(m_1n_1u_1^2 + m_2n_2u_2^2 + \text{etc}),$$

which is Dalton's law And if there is equilibrium of temperature,

$$\tfrac{1}{2}m_1u_1^2 = \tfrac{1}{2}m_1u_2^2 = \text{etc},$$

and therefore

$$p = \tfrac{1}{3}m_1u_1^2(n_1 + n_2 + \text{etc}),$$

which states that for a given value of $\frac{1}{2} m_1u_1^2$ (i e, temperature) the pressure depends simply on the *number* of the spheres per cubic centimeter, not on their masses. This is equivalent to Avogadro's rule (q v), another of the general principles concerning gases Looked at in a different way If there are two sets of spheres in different reservoirs at the same pressure, $m_1n_1u_1^2 = m_2n_2u_2^2$, if, further, their values of mu^2 are the same (i e, their temperatures), $m_2u_1^2 = m_2u_2^2$ Hence $n_1 = n_2$, or they have the same number of spheres per cubic centimeter The densities of the two are $\rho_1 = m_1n_1$, $\rho_2 = m_2n_2$, so, if the pressures and "temperatures" are the same,

$$\frac{m_1}{m_2} = \frac{\rho_1}{\rho_2},$$

which is the formula used in determining the "molecular weights" of gases See MOLECULES —MOLECULAR WEIGHTS

It can be shown, further, that the greatest possible value of γ, the ratio of the specific heats, is 1 67, but if the molecules are complex, so that there is internal energy in them, γ must be less It is interesting to note that for helium, argon, and mercury vapor $\gamma = 1\ 67$, as found by direct experiment

The properties of the pressure due to the atmosphere around the earth are discussed in the article ATMOSPHERE Only a few points need be mentioned here The pressure is measured by a barometer (q v) and is found nearly to equal that of 76 centimeters of mercury at sea level and at 45° latitude, i e, 76×13 6×980, or 1,013,300 dynes per square centimeter The barometer was invented by Torricelli, a pupil of Galileo, and the first instrument was made and used by Viviani in 1643 Pascal in 1648 showed that the height of the barometer varied with different heights above the earth and proved that the pressure of the atmosphere obeyed the laws of liquid pressure Von Guericke invented the air pump (q v) in 1650 and without knowing of Torricelli's work discovered the properties of atmospheric pressure He did not publish an account of his work, however, until 1672 Boyle published in 1660 an account of his experiments with an air pump illustrating the properties of the pressure due to the air

The action of lift pumps, siphons, etc, depends upon atmospheric pressure Air pumps are instruments designed to exhaust the gas from a closed space, such as a glass bulb

Consult Kimball, *Physical Properties of Gases* (Boston, 1890), Barus, *Laws of Gases*, "Scientific Memoir Series," vol v (New York, 1899), Randall, *Expansion of Gases*, "Scientific Memoir Series," vol xv (New York, 1901), Tait, *Properties of Matter* (Edinburgh, 1885), Meyer, *The Kinetic Theory of Gases* (London, 1899), Travers, *Experimental Study of Gases* (New York, 1901), Coste, *The Calorific Power of Gas* (Philadelphia, 1912) See DIFFUSION, EFFUSION, MATTER, THEORIES OF, CHEMISTRY, etc

GASES, LIQUEFACTION OF See CRITICAL POINT, LIQUEFACTION OF GASES, REFRIGERATION

GASES, POISON See CHEMICAL WARFARE, and SURGERY, MILITARY

GAS'KELL, MRS ELIZABETH CLEGHORN (1810–65) An English novelist, born in Chelsea, Sept 29, 1810, the daughter of William Stevenson When she was only a few weeks old, her mother died, and she was brought up by her aunt at Knutsford in Cheshire—the village afterward described in *Cranford* She was sent to school at Stratford-on-Avon, where she learned Latin, French, and Italian In 1832 she married Rev William Gaskell, a Unitarian minister of Manchester Her first novel, *Mary Barton*, appeared anonymously in 1848 It was followed by *Ruth* (1853), *Cranford* (1853), *North and South* (1855), *Lizzie Leigh* (1855), *Sylvia's Lovers* (1863) *Cousin Phillis* (1865), *Wives and Daughters* (1865), and many short tales Mrs Gaskell's usual aim was to combine instruction with pleasure Her first novel and several others depict the habits, thoughts, privations, and struggles of the industrial poor, as she herself had observed them in Manchester Her classic, however, is the delightfully and delicately humorous *Cranford*, with its inimitable sketches of a quaint town and its spinsters Mrs Gaskell wrote an admirable biography, *The Life of Charlotte Bronte* (1857) The Knutsford edition (8 vols, London, 1906) of her works, with its full and excellent introductions, is the most satisfactory edition Consult C K Shorter, *Mrs. Gaskell* (London, 1904), and E A Chadwick, *Mrs Gaskell Haunts, Homes, and Stories* (New York, 1911)

GASKELL, WALTER HOLBROOK (1847–1914). An English physiologist He was born at Naples, Italy, was educated at Trinity College, Cambridge, studied medicine at University Hospital and Leipzig University, and in 1883 was appointed university lecturer in physiology at Cambridge In 1889 he became fellow of Trinity Hall and in the same year received the gold medal of the Royal Society for his investigations regarding the sympathetic nervous system His name is identified with the theory that the central nervous system in vertebrates has resulted from the coalescence of the alimentary canal and the central nervous system of some crustacean-like ancestral form In 1896 he was elected president of the physiological section of the British Association for the Advancement of Science and in 1905 honorable fellow of the Medico-Chirurgical Society.

GAS'OLINE A distillate from petroleum (q v) used extensively as a fuel for internal-combustion engines (q v), especially those of motor vehicles (q v) It is chiefly produced by the fractional distillation of "refinably crude" petroleums containing a large proportion of

paraffin hydrocarbons, but is also obtained by the so-called "cracking" process, by the condensation of natural gas, and from oil-bearing shales Strictly speaking, gasoline is the fraction intermediate between petroleum ether and naphtha, but the name is applied to various mixtures of the lighter distillates, so that its specific gravity may range from 80° Baumé to 62° Baumé and its boiling point from 90° F to 200° F The commercial term "gasoline" includes naphthas and the lighter petroleum products In the "straight" distilling process the benzine distillate, or light or crude naphtha, is the first product, and this when redistilled yields in the order named cymogene, rhigolene, gasoline, C naphtha (benzine), B naphtha, and A naphtha (petroleum naphtha) From 100 barrels (42 gallons each) of crude oil five to seven barrels of commercial gasoline are yielded by this process The more efficient "cracking" process involves destructive distillation where the heavier vapors, becoming condensed, are superheated and decomposed, as they fall back upon the hot oil in the still, securing a more complete separation of the fractions The Burton "cracking" process of the Standard Oil Company in 1916 produced more than 3,000,000 barrels of gasoline from certain low-grade petroleum distillate, or the equivalent of the ordinary recovery of gasoline from 18,000,000 barrels of crude oil containing 17 per cent of gasoline Up to 1916 this process had not been used for kerosene, heavy residuum oils, and asphaltic crude oils On the other hand, in the process developed in the United States Bureau of Mines by W F Rittman in 1915, gasoline can be produced from crude oil, kerosene, or any low-grade distillate in increased yield by control of the temperatures and pressures of the decompositions

Gasoline also may be extracted from natural gas by compression With over 3,000,000 motor vehicles in the United States in 1917 the question of gasoline is a vital one A production of 6,680,000 barrels in 1899 had increased to 41,600,000 barrels in 1915, of which 6,500,000 barrels were exported The price of gasoline, which increased from 13 cents a gallon to 21 cents between Jan 1, 1915, and Jan 1, 1916, varies with the price of crude oil, but not always proportionately

GASOLINE-ELECTRIC CARS. See ELECTRIC RAILWAYS, *Electric Locomotives*

GASOMETER See GAS, ILLUMINATING AND FUEL

GASPARIN, ga'spa'răN', AGÉNOR ETIENNE, COUNT DE (1810–71) A French statesman and author, born at Orange He was a department chief under his father (then Minister of Interior), master of requests in the Council of State, and Deputy from Bastia (Corsica) in 1842–46. As religious reformer he was associated with Frédéric Monod (q v) From 1849 he lived in Geneva. Gasparin made early scientific experiments on table tipping and wrote on it (1854) He published also many monographs on the separation of church and state, the abolition of slavery, the reform of home life, and the Franco-Prussian War Consult biographies by Naville (Geneva, 1871) and Borel (2d ed, Paris, 1879) See GASPARIN, VALÉRIE

GASPARIN, VALÉRIE BOISSIER, COUNTESS DE (1813–94) A French woman of letters, wife of the above Born at Geneva, she lived mostly in Canton Vaud, Switzerland Besides translations, travel books, and novels, she published *Le mariage de point de vue chrétien* (1842) and *Il y a des pauvres à Paris et ailleurs* (1846), each of which won the Montyon prize of the French Academy, *Les horizons prochains* (1859) and *Les horizons célestes* (1859), translated into English as *The Near and the Heavenly Horizons* (1862), *Les tristesses humaines* (1863), attacks on various social evils Consult biography by Barbey-Boissier (Paris, 1902)

GASPARINO DA BARZIZZA, ga'spa-rē'nō da bar-tsē'tsa (c 1359–1431) An Italian humanist, born at Barzizza, Bergamo He taught at Venice and Padua and in 1418 established a school at Pavia He laid stress on Latin epistolography and especially the letters of Cicero His *Works* were published at Rome in 1723

GASPARY, gas'pa-rē, ADOLF (1849–92) A German Romance philologist, born in Berlin He became lecturer at Berlin University (1879), professor at Breslau (1883), and accepted (1891) but never occupied a chair at Gottingen He ranks among the foremost German Italian scholars of half a century The incomplete *Geschichte der italienischen Litteratur* (1885–88), his chief work, and *Die sizilianische Dichterschule des dreizehnten Jahrhunderts* (1878) have been translated into Italian.

GASPÉ, gas'pā' The most easterly district in the Province of Quebec, Canada, consisting of the counties of Gaspé and Bonaventure, chiefly a peninsula projecting into the Gulf of St Lawrence, between the estuary of the same name on the north and the Bay of Chaleurs on the south (Map: Quebec, B 2) It consists of an elevated plateau traversed by the Schikshock or Notre Dame Mountains, ranging from 3500 to 3800 feet in height and terminating in Cape Gaspé, a bold headland of sandstone 690 feet high Area, 8015 square miles Pop, 1901, 55,178, 1911, 63,111, the greater number of the inhabitants being of French descent. Lumbering and fishing are the chief occupations of the country

GASPÉ A village in the Province of Quebec, Canada, which gives its name to the district (q v) and the bay on which it stands (Map Quebec, C 2) It is the commercial centre of the extensive fishing industries of the region and is a favorite summer resort for sportsmen attracted thither by fine angling and the varied scenery. The United States is represented by a consul and a vice consul It was here that Jacques Cartier landed in 1534 and took formal possession of the country for the King of France It was the scene of the destruction of a French fleet in 1627, in 1760 it was captured by the English Pop, 1901, 454, 1911, 606

GASPÉ, PHILIP IGNATIUS (1714–87) A French-Canadian soldier He accompanied De Longueil on the expedition against the Chicacha and Natchez Indians (1739) and subsequently led troops from Mackinac in attacks on the English colonists In 1750–52 he was in command of a fort on the St John River and in 1758 led the Canadian militia in the defense of Fort Carillon (better known under its English name of Ticonderoga), when 3600 troops under Montcalm repulsed an English army about four times as numerous under Abercromby After the surrender of Quebec in 1759 he commanded the grenadiers of De Lévis

GAS POISONING See CHEMICAL WARFARE, and SURGERY, MILITARY

GASQUET, gas'kā', FRANCIS AIDAN, CARDINAL (1846–) An English Catholic prelate and historian, born in London He was educated at Downside College and in 1878–84 was

superior of the Benedictine monastery and college of St Gregory at Downside He afterward became abbot president of the English Benedictines, president of the International Commission for the Revision of the Vulgate, and (1914) Cardinal Among his important publications are *Henry VIII and the English Monasteries* (1888–89, 2d ed, 1906), *Edward VI and the Book of Common Prayer* (1890), *The Last Abbot of Glastonbury* (1895, 2d ed, 1908), *A Sketch of Monastic Constitutional History* (1896), *The Old English Bible* (1897, new ed, 1908), *The Eve of the Reformation* (1900), *A Short History of the Catholic Church in England* (1903), *Vita antiquissima B Gregorii Magni* (1903), *Collectio Anglo-Premonstratensia* (1904 et seq), *English Monastic Life* (1904), *Henry III and the Church* (1905), *Lord Acton and his Circle* (1906), *Parish Life in Mediæval England* (1906), *The Greater Abbeys of England* (1908), *The Black Death of 1348 and 1349* (2d ed, 1908), *England under the Old Religion* (1912), *Breaking with the Past* (1914)

GASS, gas, WILHELM (1813–89) A German Protestant theologian, born in Breslau He studied at Breslau, Halle, and Berlin, became a lecturer in theology at Breslau in 1839 and in 1846 was appointed professor, was professor at Greifswald from 1847 to 1862, at Giessen in 1862–68, and from 1868 at Heidelberg His chief work is *Geschichte der protestantischen Dogmatik* (4 vols, 1854–67) His other publications include *Gennadius und Pletho, Aristotelismus und Platonismus in der griechischen Kirche* (1844), *Die Mystik des Nikolaus Kabasilas vom Leben in Christo* (1849), *Geschichte der christlichen Ethik* (2 vols, 1881–87) He was an associate editor of the *Zeitschrift für Kirchengeschichte* (after 1876) and of the *Theologischer Jahresbericht*

GASSENDI, ga'saN'dē', or **GASSEND,** gas'saN', PIERRE (1592–1655) An eminent French philosopher and mathematician He was born at Champtercier, a little village of Provence, in the Department of Basses-Alpes His unusual powers of mind showed themselves at an early age, and at the age of 16 he became instructor of rhetoric, then professor of theology, at Aix, and in 1616 professor of philosophy He meanwhile applied himself with zeal to the study of the natural sciences that were taught in his day and was especially interested in astronomy and anatomy In philosophy he became disgusted with scholasticism and undertook to maintain certain theses against the Aristotelians His polemic appeared at Grenoble in 1624 and was entitled *Exercitationes Paradoxicæ adversus Aristoteleos* He drew a distinction between the Church and the scholastic philosophy, denying that the former must stand or fall by the latter In 1623 he was appointed provost of the cathedral at Digne, an office which enabled him to pursue without distraction his astronomical and philosophical studies At the recommendation of the Archbishop of Lyons, a brother of Cardinal Richelieu, Gassendi was appointed in 1645 professor of mathematics in the Collège Royal de France, at Paris, where he died, Oct 14, 1655 As a philosopher, Gassendi revived and maintained, with great learning and ingenuity, the doctrines of Epicurus, as he found the atomistic philosophy most easily brought into harmony with his own scientific acquirements and modes of thought His Epicureanism, however, was not allowed to interfere with his loyalty to the Catholic faith He reconciled the two views by holding that God is the First Cause, who created matter in the form of atoms and endowed these with motion, which thus becomes their indefeasible characteristic His great philosophical opponent was Descartes (q v) His philosophy was in such repute that the savants of that time were divided into Cartesians and Gassendists The two chiefs themselves always entertained the highest respect for each other and were at one time on the friendliest terms Gassendi ranked Kepler and Galileo among his friends, and was himself the instructor of Molière He published *De Vita, Moribus, et Placitis Epicuri* (1647) and *Philosophiæ Epicuri Syntagma* (1649) They contain a complete view of the system of Epicurus His *Institutio Astronomica* (1647) is a clear and connected representation of the state of the science in his own day, in a later work he gave the biography of Tycho Brahe, Copernicus, and other astronomers, and a history of astronomy down to his own time But his principal philosophical work is *Syntagma philosophicum* in three parts, dealing respectively with logic, physics, and ethics This work appears as the first two volumes of his collected writings in six volumes, published at Leyden (1658) Another edition of his collected works was published at Florence (1727) Consult Thomas, *La philosophie de Gassendi* (Paris, 1889), Martin, *Histoire de la vie et des écrits de Gassendi* (Paris, 1853), Kiefl, *Gassendis Erkenntnistheorie und seine Stellung zum Materialismus* (Fulda, 1893), Brett, *Philosophy of Gassendi* (London, 1908)

GASSER, gas'ēr, HANS (1817–68) An Austrian sculptor, born at Eisentratten, Carinthia He studied in Vienna under Klieber and Kahssmann and afterward in Munich with Schwanthaler. He began as a portraitist, and his statuette of Jenny Lind and busts of Rahl and Stefan Szechenyi show considerable power Although he inclined to realism, he was too prolific to be careful in execution or profound in conception His other works include the statue of Adam Smith at Oxford allegorical statues for the arsenal and other public buildings of Vienna, the not very successful monument to Wieland at Weimar, the statues of Maria Theresa in Wiener-Neustadt and of the Empress Elizabeth at the Elizabeth Railroad Station He is at his best, however, in the "Donauweibchen" (Danube Maiden), in the Vienna Stadtpark, and the charming "Twelve Months" in the Belvedere

GASSER VON VALHORN, gas'sēr fŏn fal'hôrn, JOSEPH (1816–1900) An Austrian sculptor, brother of Hans Gasser He was born at Pragraten, Tirol, and studied at the Vienna Academy under Schaller, Klieber, and Kahssmann, and from 1845 to 1849 in Rome After his return he executed for the portal of the cathedral of Speier five statues of heroic size Among the numerous works intrusted to him subsequently in Vienna, where he had settled in 1852, the best are the statues of Emperor Maximilian I, Frederick the Warlike, and Leopold of Hapsburg, in the Arsenal, busts of the Emperor and Empress of Mexico, the marble statues of the "Seven Liberal Arts" in the staircase of the opera house, 24 statues in St. Stephen's Cathedral, and especially the sculptures for the Votivkirche, including the large bas-reliefs on the three main portals He was

professor at the Academy from 1865 to 1873 and received a title of nobility in 1879

GASSION, ga'syōn', JEAN DE (1609–47). A French general, born at Pau He fought under the Prince of Piedmont in 1625 and under the Duke de Rohan in 1628 In 1629 he joined a troop of French volunteers and entered the service of Gustavus Adolphus With him he fought at Leipzig (1631) and saved his life afterward at the siege of Ingolstadt As a reward, the King gave him command of a regiment He further distinguished himself at Nuremberg and Lutzen After the King's death he returned to France and fought bravely in the battles of Charmes and Neuchâtel and at the sieges of Dôle, Hesdin, and Landrecies He was made maréchal de camp (1638) and materially assisted in the French victory of Rocroi (1643) He received the baton of a marshal of France in 1643 He died from a wound received under the walls of Lens

GASSNER, gas'nĕr, JOHANN JOSEPH (1727–79) A priest who gained renown as an exorcist He was born at Bratz, near Bludenz, in the Tirol, and became a Catholic priest at Klosterle, in the diocese of Chur (1758) The accounts of demoniacs in the New Testament, with the writings of celebrated magicians, brought him to the conviction that most diseases are attributable to evil spirits, whose power can be destroyed only by conjuration and prayer He began to practice on some of his parishioners and succeeded in healing many He was convinced that he had recovered his own health, which had begun to fail, by exorcism The Bishop of Constance called him to his residence, but, having come to the conviction that he was a charlatan, advised him to return to his parsonage Gassner betook himself, however, to other prelates of the Empire, some of whom believed that his cures were miraculous He gained influential supporters and was sustained by the ecclesiastical authorities, although innumerable attacks were made upon his methods and the genuineness of his cures Consult his life by Zimmermann (Kempten, 1878)

GAST, gast, FREDERICK AUGUSTUS (1835–) An American clergyman of the Reformed church in the United States, born at Lancaster, Pa He graduated in 1856 at Franklin and Marshall College (Lancaster), studied at the Mercersburg Theological Seminary (now at Lancaster), and in 1859–65 was pastor at New Holland, Pa In 1865 he was chaplain of the Forty-fifth Pennsylvania Volunteers, in 1865–67 pastor at London and St Thomas, Pa, and in 1867–71 principal of the academy connected with Franklin and Marshall College In 1871 and 1872 he was assistant professor in the college, from 1871 to 1873 a tutor and from 1873 to 1909 professor of Hebrew and Old Testament theology in the Lancaster Theological Seminary

GAS TAR See COAL TAR

GASTEIN, ga'stīn A valley in the Austrian Duchy of Salzburg, celebrated for its mineral springs (Map Austria-Hungary, C 3) It is a side valley of the upper Salzach valley, and is about 25 miles long and 1¼ miles broad, with an elevation of between 3000 and 3500 feet It is traversed by the river Ache, which forms near Wildbad-Gastein two magnificent waterfalls—the upper, the Kesselfall, 200 feet, and the lower, the Barenfall, 280 feet in height—and by the Tauern Railway, which goes to Mallnitz The principal villages are Bockstein, Hof-Gastein, and Wildbad-Gastein Hof-Gastein, with a number of deserted gold and silver mines in the vicinity, contains a military hospital, and in the open platz there is a bust of the Emperor Francis I, who in 1828 caused a conduit of upward of 5 miles in length to be constructed for the purpose of conveying the mineral waters thither from Wildbad Wildbad, the principal watering place, is a fashionable health resort and contains a number of hotels and villas The water of the springs is considered efficacious in the case of nervous and skin diseases

GASTEIN, CONVENTION OF A treaty concluded at Wildbad-Gastein, Aug 14, 1865, between Austria and Prussia, regulating the relations of these two powers with respect to the duchies of Schleswig-Holstein (q v) and Lauenburg, which they had taken from Denmark and occupied in common Schleswig was placed under Prussian administration, and Holstein under Austrian, while Lauenburg was annexed to Prussia, Austria ceding its share for 2,500,000 rix thalers This convention postponed for a short time only the outbreak of the war between the two countries See GERMANY

GAS'TER, MOSES (1856–) A Semitic scholar, born in Bucharest and educated there, at Leipzig, and at Breslau In 1881–85 he was a lecturer on Rumanian language and literature in the University of Bucharest and then was exiled because he labored in behalf of the persecuted Rumanian Jews He settled in England, became chief rabbi of the Sephardic communities in England (1887), was principal of the Montefiore College in Ramsgate (1890–96), and was Ilchester lecturer at Oxford in 1886 and 1891 He wrote on folklore, gypsies, Rumanian language and literature, and Biblical questions for special reviews, and published *Literatura populara româna* (1883), *Chrestomathie roumaine* (1891), "Geschichte der rumänischen Litteratur," in Groeber's *Grundriss der romanischen Philologie* (1899), *Sephardic Prayer Book* (1901–06), *The Samaritan Book of Joshua* (1908), *The Hebrew Divorce* (1911)

GAS'TEROMYCE'TES (Neo-Lat nom pl, from Gk γαστήρ, *gastēr*, stomach + μύκης, mykēs, mushroom) One of the great groups of Basidiomycetes (q v) It contains the most highly organized of the fungi, their complexity appearing in the structure of the fructification The most familar forms are the puffballs The name refers to the fact that the spore-producing cells are inclosed within the fruitlike body This body is of various forms and structures, but the globular puffball is the best illustration

GASTINE, ga'stēn', CIVIQUE (1793–1822) A West Indian reformer and author, born at Fort de France in the island of Martinique He was educated in New Orleans (1803–09) and in Philadelphia, where he studied law, but in 1813 had to make his escape to Paris because he had written and spoken too boldly in favor of the negro In 1815 he began to publish a journal, *L'Ami du Noir*, whose utterances often subjected him to imprisonment or fines Finally, upon the publication of his *De la nécessité de faire un traité de commerce avec Haïti* (1821), he was banished He proceeded to Haiti, where he was granted an annual pension of 5000 francs and appointed Secretary of Foreign Relations He wrote *Histoire de la république de Haïti* (1819), *L'Esclavage aux Etats-Unis* (1819), and an *Histoire de l'esclavage dans la Louisiana* (1820).

GASTINEAU, ga'stē'nō', BENJAMIN (1823–1904) A French author, born at Montreuil-Bellay He was at first a printer, but first attracted attention by a series of articles in *L'Ami du Peuple* in 1851, which led to his arrest and deportation to Algeria He returned to France in 1854, but his connection with the *Guetteur de Saint-Quentin*, which he edited in 1856–58, brought upon him the displeasure of the government, and he was again deported After the insurrection of March, 1871, he was placed in charge of the Mazarin Library by the Communists For this he was in the following year again sentenced to deportation (in his absence), but returned to France after the general amnesty In addition to frequent contributions to the reviews, he published a large number of books, mostly political or historical, including *Lutte du catholicisme et de la philosophie* (1844), *Le bonheur sur terre* (1844), *La guerre des Jésuites* (1845), *L'Orpheline de Waterloo* (1847), *Le régime de Satan, ou les riches et les pauvres* (1848), *Les femmes et les mœurs de l'Algérie* (1852), *Histoire de la folie humaine* (1862), *Les femmes des Césars* (1863), *Les génies de la liberté* (1865), *Les socialistes* (1865), *Les drames du mariage* (1865); *Les victimes d'Isabelle II* (1868), *L'Impératrice du Bas-Empire* (1870), *Le centenaire de Voltaire* (1878), *Les femmes et les prêtres* (1888), *Les crimes des prêtres de l'église*

GASTON, ga'stōn', MARIE A nom de plume of Alphonse Daudet

GAS'TON, WILLIAM (1778–1844) An American orator and jurist, born in Newbern, N C, of a Huguenot family which for several generations had lived in Ireland He graduated at Princeton in 1796, studied law with F X Martin, was admitted to the bar in 1798, and in 1800 was elected to the North Carolina Senate, in which he served also in 1812–13 and 1818–20 He was a presidential elector in 1808, and from 1813 to 1817 a Federalist member of Congress, where he achieved a reputation as an orator by an able speech in opposition to the Loan Bill in 1815 In 1808–10, 1827–29, and 1831–32 he was a member of the State Assembly, where he drafted the act regulating the descent of inheritances and the act establishing the present Supreme Court of the State. He served as a judge of this court from 1834 until his death, was a member of the Constitutional convention of 1835, and in 1840 refused the nomination as United States Senator After the disappearance of the Federal party he became a Whig and zealously opposed the South Carolina nullification doctrine

GASTON DE FOIX, de fwa, DUC DE NEMOURS See FOIX

GASTO'NIA A city and the county seat of Gaston Co N C, 23 miles west of Charlotte, on the Southern, the Piedmont and Northern, and the Carolina and Northwestern railroads (Map North Carolina, A 2) It is a manufacturing centre, having a number of cotton mills, oil works, and manufactures of wood fibre, cotton-mill machinery, brooms, mattresses, cement, etc Under an amended charter of 1898, it is governed by a mayor and a unicameral council The water works and electric-light plant are owned by the city Pop., 1900, 4610; 1910, 5759, 1920, 12,871

GASTOR'NIS (from *Gast*-on Planté, the discoverer of the bird + Gk *ὄρνις, ornis*, bird) A genus, or perhaps a family (Gastornithidæ), of extinct gigantic birds, larger than and related to the ostriches, whose bones are found in the Lower Eocene of France and England, and which is represented in coeval formations in the United States by the genus *Diatryma* 'In the European gastornis the component bones of the skull remained separate throughout life, and there may have been a tooth on each side of the upper jaw" See BRONTORNIS

GASTRÆ'A THEORY (Neo-Lat, from Gk *γαστήρ gastēr*, stomach) A theory propounded by E Haeckel, according to which the gastrula stage in the development of animals (see EMBRYOLOGY) is a recapitulation of a hypothetical common ancestor—the gastræa, for just as the two-layered gastrula stage, although sometimes disguised by the presence of much yolk, is common in the embryological development of the Metazoa, so in their phylogenetic development there was a primitive type that was the starting point from which all the various metazoan types have developed along diverging lines The gastrula is the type which seems to be the common one in the embryological development of the Metazoa The hypothetical phylogenetic type, the starting point of the Metazoa, Haeckel named "gastræa" The Gastræidæ were supposed to be of world-wide distribution and of many families and genera The outer and inner layers of the gastrula and the gastræa Haeckel homologized with the ectoderm and entoderm of the Metazoa This theory, however, should not be wholly ascribed to Haeckel, for the homologies of the germ layers had already been pointed out by Kowalewsky, Von Baer, Remak, and others Kowalewsky concluded from his embryological researches that the nervous layers and the ectoderm of insects and vertebrates are homologous, and that the germinal layers of *Amphioxus* and vertebrates correspond with those of ascidians and worms Kowalewsky, indeed, believed "that the homologies of the general layers in the different types afford a scientific basis for comparative anatomy and embryology, and must be recognized as the starting point for the proper understanding of the relationships of the types" The generalizations of Haeckel, although based largely on such work as Kowalewsky's, are much bolder than those just quoted

The simplest and probably the most primitive gastrula seen in vertebrate development is that of *Amphioxus* The blastula, or stage that is antecedent to the gastrula in *Amphioxus*, is composed of a single layer of cylindrical cells closely joined in the shape of a hollow sphere At one place in this sphere, called the vegetative pole, the cells are larger and contain more yolk granules than the cells of the rest of the circumference The vegetative surface begins to flatten and then to push towards the inside of the sphere This inpushing is termed "invagination" As the cavity formed by invagination grows larger, the original cleavage cavity in the sphere grows smaller, until finally it is wholly obliterated The resulting individual is two-layered and cup-shaped, with one large opening to the exterior, the primitive mouth or blastopore This double-layered, cup-shaped individual is the gastrula, and its inner cavity is the primitive intestine Neither this mouth nor the intestine is homologous with the mouth or the intestine of the adult animal The two primary germ layers of the gastrula are known

as ectoderm and entoderm The outer, or ectoderm, is the sensitive layer, and the inner is the nutritive layer C E von Baer calls them, in view of their function, the two primitive organs of the animal body By the separation and differentiation of cells from one or the other, or both of these layers, all subsequent development and differentiation of the body is brought about Embryonic stages quite like this of the *Amphioxus* are known to exist in the Cœlenterata, some Scolecida, Echinodermata, and some Annelida, in addition to those of the higher vertebrates

As Huxley has pointed out, the Porifera and Cœlenterata very nearly approach the conditions of the gastræa The fresh-water hydra and the microhydra, e g, are two-layered animals with a central digestive cavity surrounded by both layers and opening to the exterior at a point about the margins of which the two layers are continuous This permanent mouth is the terminal aperture of the gastræa and serves both for the ingestion and extrusion of materials, while in the Porifera it serves as the permanent egestive opening only

GASTRAL'GIA, or GAS'TRODYN'IA See INDIGESTION

GAS'TRIC FEVER See TYPHOID FEVER

GASTRIC JUICE See DIGESTION, ORGANS OF, FOOD, GASTRITIS

GASTRITIS, găs-trī'tĭs (Neo-Lat, from Gk γαστήρ, *gastēr*, stomach) A disease in which the mucous membrane of the stomach is the seat of disordered action accompanied by inflammation Acute gastritis may be of three forms 1 *Acute catarrhal gastritis,* in which there is a feeling of fullness, production of gas in the stomach, nausea, slight pain, severe headache, often rise of temperature, possibly vomiting, diarrhœa or constipation, with furred tongue It is caused by errors in diet, such as excessive quantities of food, ice-cold drinks, spiced or fermented food, or alcoholic beverages It is very common and, except in the aged, has a favorable prognosis Emptying the stomach by washing with a tube or pump is good treatment in some instances Some aperient is generally very desirable, and abstinence from food should be practiced for two or three days 2. *Toxic gastritis* is caused by alcohol, phosphorus, arsenic, corrosive sublimate, chlorate of potash, mineral acids, caustic alkalies, etc The symptoms are as given for acute catarrhal gastritis, with vomiting of blood, torturing thirst, small pulse, cyanosis, cold perspiration, and even coma and death in grave cases The treatment consists in antidoting the poison taken, and in some cases washing the stomach 3 *Purulent* or *phlegmonous gastritis,* in which variety small abscesses form in the submucous or muscular layer of the stomach walls After dyspeptic symptoms for several days, burning pain, thirst, revulsion against food, fever reaching 103° to 105° F, small, irregular pulse, vomiting of mucus and bile, and generally diarrhœa follow Death generally supervenes in from four days to two weeks

In *chronic gastritis* the symptoms are as in the acute catarrhal form, persisting permanently, with constipation alternating with diarrhœa, pyrosis, scanty urine, cold hands and feet, irregular and capricious appetite, sallow skin, coated tongue. There is generally a decrease in the secretion of gastric juice, and low acidity, as learned from a test meal This form of gastritis is common in men in middle life and is the result of abuse of the stomach by eating rich, highly seasoned foods and indulgence in alcohol and tobacco to excess Chronic affections of the heart, liver or kidneys often coexist Diet and hygiene, occasional lavage, certain mineral waters, and very little drugging help many cases to enjoy life for years Outdoor exercise, spinal douches, faradization, and massage are useful adjuncts to the treatment

Pathology In acute catarrhal gastritis the mucous membrane of the stomach is swollen and red, and coated with an increased amount of mucus, although the secretion of gastric juice is less than normal The cells of the mucous membrane, both mucous and peptic, are swollen and granular, and there may be considerable infiltration of the interstitial tissue with serum and leucocytes In the acute gastritis due to the taking of irritant poisons, such as strong acids, caustic alkalies, corrosive sublimate, etc, the changes in the stomach are directly proportioned to the quantity and strength of the poison taken Thus, strong acid in large quantities may not only destroy the entire mucous membrane of the stomach, but may cause extensive destruction of the deeper coats, even causing perforation Smaller quantities destroy portions of the mucous membrane and underlying tissue, with consequent sloughing and cicatrization In chronic gastritis the stomach may be of normal size, small, or enlarged The mucous membrane may be thickened or thinner than normal and is usually coated with thick tenacious mucus It may be red and congested or of a dull gray color There are atrophy of the gastric tubules and an increase in the tubular connective tissue The stomach walls are sometimes greatly thickened from the formation of new fibrous tissue, and the capacity of the organ is thus greatly diminished A form of gastritis characterized by the formation of a false membrane is known as croupous, membranous, or diphtheritic gastritis In connection with suppurative processes in other parts of the body, there may be suppuration with abscess formation in the walls of the stomach, this condition constituting what is known as suppurative or purulent gastritis

GASTROCHÆNA, găs'trō-kē'nȧ (Neo-Lat, from Gk γαστήρ, *gastēr*, stomach + χαίνειν, *chainein*, to gape) A genus of lamellibranchiate mollusks, having a delicate shell of two equal valves, gaping very much in front The animal sometimes takes possession of an already existing cavity, which it often coats with a calcareous lining, so as to form a tube, to which the valves of its shell are cemented, sometimes burrows for itself in sand, coral, or calcareous rocks, and lines its hole with a shelly layer One species (*Gastrochæna modiolina*), common in the Mediterranean, perforates shells and limestone, making holes about 2 inches deep and ½ inch in diameter The tubes of some of the tropical species which live in sand are very curious See WATERING-POT SHELL

GASTROCNEMIUS MUSCLE (găs'trŏk-nē'mĭ-ŭs) (Neo-Lat, from Gk γαστροκνημία, *gastroknēmia*, calf of the leg, from γαστήρ, *gastēr*, stomach + κνήμη, *knēmē*, knee) The muscle which forms the greater part of the calf of the leg It rises by two heads from the two condyles of the femur, or thigh bone, and is inserted through the tendo Achillis into the posterior part of the heel bone. In man this muscle possesses great power and is constantly called

into use in standing, walking, leaping, etc In walking it raises the heel, and with it the entire body from the ground, and, the body being thus supported on the raised foot, the other leg is carried forward From its close association with the erect position, it is much more developed in man than in other mammals

GAS'TROEN'TERI'TIS (Neo-Lat, from Gk γαστήρ, *gastēr*, stomach + ἔντερον, *enteron*, intestine) An inflammatory disease of the stomach and small intestine resulting in disordered function, vomiting, and diarrhœa In children the disease is called cholera infantum (q v) It is the "summer diarrhœa" which proves fatal to so many infants fed on cow's milk from unclean bottles In children it is ushered in by slight fever, fretfulness, diarrhœa, coated tongue, and loss of appetite In a few days the diarrhœa becomes worse, the stools are thin, green, yellow, or brown, and contain undigested food and mucus, and their odor is very offensive The infant becomes pale and rapidly emaciates It may improve from this point and recover in a week, or it may suddenly suffer from a rise of temperature to 103° or 105° F, cry much, evince great thirst, and exhibit a weak pulse Stupor, sunken eyes, general relaxation, and even convulsions may follow Vomiting supervenes on taking any food or water, and death results from exhaustion The treatment consists in administering a purgative (calomel or castor oil preferably), withholding all food for 12 hours or more, allaying thirst with small quantities of barley water, followed by nursing every four hours, for two or three minutes at a time, washing out the stomach in the worst cases, and irrigating the large intestine by means of a tube A normal salt solution at 80° F is best for this purpose Subnitrate or subgallate of bismuth, salol, hydrochloric acid, with small doses of opium in selected cases, and stimulants such as brandy where collapse threatens, are all of value City children are benefited by removal to the country or the seashore.

Gastroenteritis of adults is discussed in CHOLERA See also ENTERITIS

GASTROENTERITIS, IN CATTLE The chief symptoms of this disease in cattle are dullness, dry skin, fullness of the left flank, and staring coat—the hair standing on end The pulse is weak, the gait staggering, and the bowels constipated The animal grunts with each breath, especially when lying down, and dies in convulsions The more common causes of the trouble are too long intervals between feeding, sudden changes of diet, sudden checking of perspiration, and violent exercise immediately after eating

When the disease is supposed to originate from imperfectly digested food, one pint of castor oil should be given, followed by liberal doses of linseed tea, to which carbonate of magnesia has been added This may be administered three or four times daily along with 10 drops of tincture of aconite

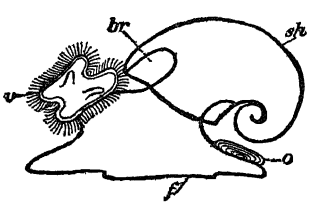
GAS'TROMANCY See SUPERSTITION

GASTROP'ODA (Neo-Lat nom pl, from Gk γαστήρ, *gastēr*, stomach + πούς, *pous*, foot) A class of mollusks characterized by having a distinct head, usually bearing eyes and tentacles, and moving by a large creeping disk, or "foot" The head and foot are bilateral, but the rest of the body (except in *Patella*, etc) is unsymmetrical The animal is usually protected by a single or univalve shell, which is more or less spirally coiled, inclosing the visceral mass, i e, heart, stomach, liver, and reproductive glands Moreover, these mollusks have, besides two pharyngeal horny teeth, a rasplike lingual ribbon (radula) forming a part of the odontophore situated in the mouth, or buccal cavity There are, in the typical forms, two plumelike gills (ctenidia) inclosed in a mantle cavity, but there may be only one, while in the air-breathing forms (*Pulmonata*, or land snails) the animal breathes the air through the wall of the mantle cavity itself, which forms the pulmonary sac, or lung The "foot" is a broad creeping disk, situated behind the head, and it is usually seen from beneath to be broad and flat See illustration under FIG SHELL

Structure A heart contained in its pericardial sac is always present, except in the parasitic *Entoconcha*, while in some genera, as *Nerita* (periwinkle) and *Haliotis* (abalone), it, as in the clam, is perforated by the intestine In a few genera there are two auricles to the heart, but, as a rule, only one is present A ventricle is always present There is but a single kidney (nephridium) The digestive canal is doubled on itself, the vent opening on one side of the mouth In certain opisthobranchs the stomach is lined with series of teeth, sometimes sharp and chitinous In some nudibranch gastropods (see NUDIBRANCHIATA) the intestine has numerous lateral offshoots, or gastrohepatic branches, which resemble similar structures in the planarian and nematode worms

The nervous system varies in the number of ganglia, but is usually represented by the "brain," a pair of supraœsophageal ganglia, with connecting threads (commissures) passing around the gullet to the infraœsophageal or pedal ganglia, thus forming the œsophageal nerve ring, there are also a pair of buccal ganglia, while the visceral and abdominal ganglia, all connected by commissures, are situated at a varying distance from the head The ears, or "otocysts," are usually near the pedal ganglia, but are always innervated from the cerebral ganglion, or "brain"

The animal in certain forms is bisexual or hermaphroditic, in others the sexual glands exist in separate individuals The eggs are laid in capsules of various sizes and shapes, usually attached to seaweeds or rocks, or deposited freely in the sand Land snails lay their eggs loose under stones or leaves in damp places The embryo on hatching passes through a well-



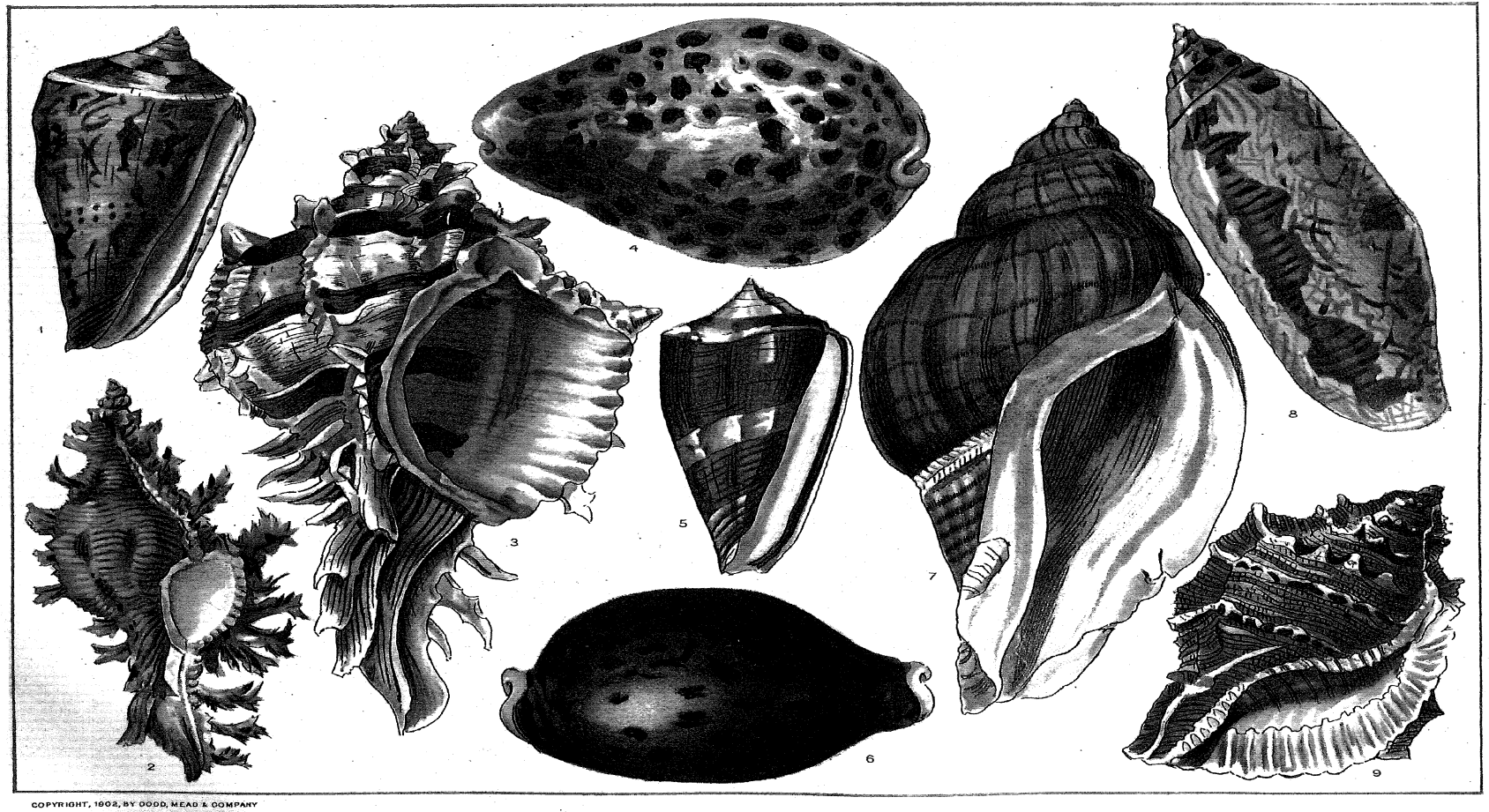
A YOUNG GASTROPOD

Veliger stage *v*, velum *f*, foot, *o*, operculum, *br*, gill chamber, *sh*, primitive shell

marked metamorphosis, the two more important stages being the trochosphere and veliger, the latter differing from the trochosphere or top-shaped primitive stage in swimming about by means of a pair of sail-like flaps

Soon after the shell of a gastropod begins

MARINE GASTROPODS



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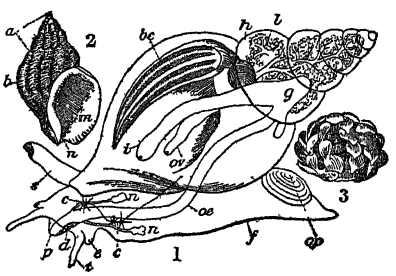
1 PURPLE CONE – CONUS PURPURASCENS
2 SAUUS MUREX – MUREX SAULÆ
3 MUREX BRASSICA
4 TIGER COWRY – CYPRÆA TIGRIS
5 ROYAL CONE – CONUS REGALITATUS
6 PANTHER COWRY – CYPRÆA PANTHERINA
7 MONOCEROS GIGANTEUM
8 CONUS AURATUS
9 RANELLA CRUMENA

NATURAL SIZE

to form, the foot grows larger, the eyes and tentacles appear, when the young sinks by gravity to the bottom and gradually assumes the snail condition of maturity The eyes may be absent in those marine forms which actively burrow in the sand, though the single pair of tentacles persists In the land snails there are two pairs of tentacles, the upper and longer pair containing both the eyes and the optic nerve with the olfactory nerve, which ends in groups of cells

A distinctive feature in gastropods is the "odontophore," an apparatus of muscles bearing the radula, or "lingual ribbon," a solid flattened ribbon-like or rasplike plate armed with transverse rows of sharp siliceous teeth This rasp is drawn back and forth over a tendon like a pulley By means of this rasp the land or pond snail cuts slits into leaves, swallowing the pieces, or the marine forms, such as the *Sycotypus* (see CONCH) or the "drill," files a hole into the clam or oyster, so as to get at the flesh within the tightly closed shell of its victim

Certain forms as the *Murex* (q v) of the Mediterranean, secrete the Tyrian dye of the ancients, and a similar fluid is secreted by the com-



STRUCTURE OF A GASTROPOD

1 Diagram of the structure of a gastropod (the common whelk) *f*, muscular "foot", *op*, operculum, *t*, one of the tentacles or feelers, *e*, eye stalk, at the base of the tentacle, *p*, proboscis, retracted, with the mouth at its extremity, *oe*, gullet, *g*, stomach, *i*, intestine, terminating in the anus, *n*, *n*, salivary glands, *l*, liver and ovary, *ov*, oviduct, *h*, heart, *bc*, gill, contained in a hood of the mantle, *s*, breathing tube or siphon, *c*, *c*, main nerve ganglia 2 Shell, with animal removed *a*, spire whorls, separated by sutures, *b*, body whorl, *m*, outer lip of "mouth", *n*, notch for the siphon at the base of columella 3 Egg capsules of the whelk

mon *Purpura* of our coast This fluid is formed in a peculiar "adrectal gland" situated at the side of the rectum It is colorless, but turns purple on exposure to the air

The shell of different gastropods varies greatly in shape In the limpets (*Patella*) it is low and conical, in most of the species it is spiral, made up of whorls The greater number of shells are "dextral," i e, the spire turns to the right, in a few cases they are sinistral or turn to the left

Over 22,000 species are known, of which about 7000 species are fossil, there are about 6500 species of land snails alone

Classification. Gastropods are divided into two subclasses (1) Streptoneura, "in which the visceral commissures are twisted into a figure of 8 and in which the sexes are distinct", and (2) Euthyneura, in which the visceral commissures are not so twisted, and in which the sexes are united The former contains the order Aspidobranchia, which includes the limpets, ear shells, top shells, turban shells, etc ; and the order Pectinibranchia, which contains the bulk of the other marine shell-bearing forms The latter subclass also has two orders Opisthobranchia, containing the sea hares (*Aplysia*), pelagic pteropods, etc , and Pulmonata, containing the land and fresh-water air-breathing snails and slugs

Fossil Gastropods Gastropod shells are found in all the geological formations from those of lowest Cambrian age to those of recent time, and they occur usually in abundance in those formations above the Cambrian The earliest forms are limpet-like shells (*Scenella*) and a capulid (*Stenotheca*) in the *Olenellus* zone of the Lower Cambrian system Very soon, in the Upper Cambrian a few turreted gastropods appear (*Raphistoma* and *Straparollina*) These true gastropods are in the Cambrian associated with a host of slender conical shells, the hyolithids, which are often classed with the pteropods, but which should more properly be placed with the tubicolar worms

In the Ordovician the gastropods are widely differentiated and are represented by numerous genera and abundant individuals, with such well-known forms as *Pleurotomaria*, *Bellerophon*, *Raphistoma*, *Murchisonia*, *Maclurea*, *Euomphalus*, and others In the Silurian a further evolution has taken place, manifested principally in the increased ornamentation of genera that come up from the Ordovician, and in the creation of new genera from those already existing Some of the important forms are *Loxonema*, *Murchisonia*, *Platyostoma*, *Pleurotomaria*, *Bucania*, *Trematonotus*, *Euomphalus* The Devonian formations are still richer in species and are characterized by such forms as *Loxonema*, *Turbo*, *Euomphalus*, *Platyostoma*, *Platyceras*, *Acroculia*, *Macrocheilus* In the Carboniferous the same genera are present, with the addition of *Naticopsis*, *Vermetus*, and *Actæonina* The Permian gastropod fauna is about the same as that of the Carboniferous The majority of the Paleozoic gastropods belong to the more primitive, less specialized subclass of the Streptoneura, and especially to the order Aspidobranchia, and it is worthy of note also that the Paleozoic genera are, as a rule, holostomatous, i e, they have shells with nonsiphonate apertures

The Triassic formations at the beginning of the Mesozoic show important changes in the gastropod fauna The Paleozoic pteropods have dropped out, the Bellerophontidæ, the Devonian Platyceridæ and Platyostomidæ have disappeared, and the euomphalids have become less abundant, and a new type of shell, the siphonostomatous, appears with the families Cerithiidæ and Melaniidæ, in which the siphon is, however, shorter than in the later members of these families The important genera are *Chemnitzia*, *Loxonema*, *Rissoa*, *Eulima*, *Trochus*, *Turbo*, *Pleurotomaria*, *Cerithium*, *Helcion* In the Jurassic the Valvatidæ, Viviparidæ, Melaniidæ, Aporrhaidæ, Strombidæ, Columbellidæ, Cypræidæ, begin their existence, and the fauna is strongly siphonostomatous One Jurassic family, the Nerineidæ, which began in the Trias and continued into the Cretaceous, is a very characteristic Mesozoic shell, that may be recognized by its slender turreted spire, resembling that of its allies the Cerithiidæ, and by the peculiar longitudinal septa that project from the columella and walls of the whorls into the central cavity of the shell

The Cretaceous ushers in another lot of families Solariidæ, Cassididæ, Doliidæ, Tritonidæ, Buccinidæ, Muricidæ, Purpuridæ, Volutidæ, Olividæ, Cancellaridæ, Pleurotomidæ, Conidæ, in

fact, all the more specialized families of the Ctenobranchiata, including more pronounced siphonate forms The gastropods hold third rank among the Cretaceous mollusks, being excelled by the clams and cephalopods In the Tertiary the gastropods rise to first rank Among the few new families appearing in the Tertiary the more important are the Harpidæ and Ovulidæ The siphonostomate shells attain here their highest development and are more prominent than any others All the Tertiary forms are closely allied to modern forms, indeed, the majority of the Pliocene fossils and a small per cent of the Miocene species are still living in the modern ocean. At the present day the gastropods are enjoying rapid progressive evolution

The history of terrestrial and fresh-water gastropods is interesting The earliest form known is Pupa, found in the Devonian beds of St John, New Brunswick, while a *Pupa* and a *Zonites*, remarkably close to the existing species, have been found in the coal measures of the Carboniferous In the Mesozoic are found numerous fluviatile genera, such as *Planorbis*, *Melania*, *Hydrobia*, *Valvata*, *Physa*, *Limnæa*, *Amnicola*, and *Carychium* In the Cretaceous appear, in addition to those already cited in the Jurassic, *Viviparia*, *Glandina*, *Bulimus*, *Goniobasis*, *Liopax*, *Pleuroceras*, and in the Tertiary deposits the land and fresh-water snails are quite as abundant as they are at the present time

Some interesting evolutional series have been worked out among fossil gastropods Neumayr has shown how *Viviparia* of the Miocene beds of Slavonia starts in the lower layers as smooth shells with rounded whorls, and changes, or evolves, through the succeeding overlying beds by successive intermediate stages into a more elevated shell, with concave whorls and nodose surfaces, that occurs only in the highest beds Hilgendorf, and afterward Hyatt, showed the peculiar transformations of *Planorbis* in the fresh-water Miocene beds of Steinheim, Wurttemberg Other similar evolutional series have been worked out for the Melaniidæ, Cerithiidæ, Volutidæ, Mitridæ, and Turritellidæ

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GASTROPTOSIS, găs'trŏp-tō'sĭs Prolapse of the stomach below its usual site in the abdomen It is commonly part of a general relaxation of the ligamentous supports of all the abdominal organs (Visceroptosis, Glenard's disease or splanchnoptosis, enteroptosis is prolapse of the intestines) This condition may result from general malnutrition, loss of the elasticity of the abdominal muscles from the pressure of improper clothing, and from chronic intestinal poisoning The symptoms are those of dyspepsia, lack of appetite and constipation, together with such nervous symptoms as headache and insomnia The treatment consists in applying an abdominal support, and the use of hygienic measures designed to strengthen the abdominal muscles Where a single organ is affected operation is sometimes necessary

GASTROS'TOMY (from Gk γαστήρ, *gastēr*, stomach + στόμα, *stoma*, mouth) An operation which is performed for the relief of stricture of the gullet Its object is to relieve the patient from the imminent risk of starvation, by introducing food directly into the stomach through an external opening The well-known case of Alexis St Martin, and numerous experiments on the lower animals, first led to the introduction of the operation as a practical surgical procedure

GASTROT'OMY (from Gk γαστήρ *gastēr*, stomach + τομή, *tomē*, a cutting, from τέμνειν, *temnein*, to cut) An incision into the cavity of the stomach for the purpose of removing some diseased structure or foreign body

GAS'TRULA. See EMBRYOLOGY, GASTRÆA THEORY

GASZYŃSKI, gä-shĭn'skē, KONSTANTY (1809–66) A Polish poet, born at Malawies He fought in the insurrection of 1830–31 and afterward went to France and settled at Aix in Provence During this exile he wrote much verse and prose, which has frequently been translated into French A collection of his stories was published in Paris in 1833 under the title *Pieśni pielgrzyma* His sonnets are particularly elegant His works include *Poezye* (1856), *Sielanka młodości* (1855), *Reszty pamiętnika Macieja Rogowskiego* (1847), *Kontuszowe pogadanki* (1851), *Listy z podrozy po Wloszech* (1853), and *Pan Dezydery Boczko* (1846) He also contributed to magazines and newspapers His complete works were published in 1870–74

GATA, ga'ta, CAPE DE See CAPE DE GATA

GATACRE, găt'ä'kēr, SIR WILLIAM FORBES (1843–1906) An English soldier, born near Stirling, and educated at Sandhurst He entered the army in 1862, passed at the Staff College in 1875, and from 1875 to 1879 was instructor in surveying at the Royal Military College In 1889–90 he served in Burma, in 1895, as brigadier general, distinguished himself in the Chitral expedition, and in 1898 went to the Sudan, where he led the British division in the battles of Atbara and Omdurman In the Boer War he was placed at the head of a division with the rank of lieutenant general, was defeated at Stormberg Junction, Dec 10, 1899, and in April, 1900, was ordered home for failing to

relieve a beleaguered British force at Reddersburg He retired in 1904 Gatacre's men "called him General 'Backacher,' and loved him" though he worked them so hard Consult the *Life* by Lady Gatacre (London, 1910)

GAT'AKER, THOMAS (1574–1654) A Puritan clergyman, critic, and author, born in London He was educated at St John's College, Cambridge, and in 1596 became one of the earliest fellows of Sidney Sussex College In 1601 he was appointed lecturer to the society of Lincoln's Inn, and from 1611 he was rector of Rotherhithe (Surrey) He declined the mastership of Trinity College, Cambridge, and in 1643 was appointed a member of the Westminster Assembly of Divines In 1645 he was elected one of seven to draft a confession of faith He was a scholar of unusual acquirements in Hebrew and the classics Hallam called Gataker's *Marcus Antoninus* (1652), the Greek text with a version and commentary in Latin, "the earliest edition of any classical writer published in England with original annotations", it was repeatedly reprinted Commentaries on Isaiah, Jeremiah, and Lamentations he prepared for the Assembly's *Annotations* (1645, 1651) His *Opera Critica,* including a *De Novi Instrumenti Stylo Dissertatio* (1648), were edited by Witsius (Utrecht, 1698) His *Of the Nature and Use of Lots* (1619, 2d ed, 1627) defended the use of lots (not for divination) and brought him into disrepute with some He wrote several controversial works and published a collection of sermons (1637) Consult the autobiographical matter in his *Adversaria Miscellanea Posthuma* (London, 1659), and Brook, *The Lives of the Puritans* (London, 1813)

GATCHINA, ga'chê-na A town of Russia in the Government of St Petersburg, situated about 28 miles south-southwest of the capital on a small lake formed by the Izhora (Map Russia, C 3) It is especially worthy of mention for its Imperial palace, constructed in 1770, which contains 600 rooms, a theatre, and art collections It is surrounded by a magnificent park It originally belonged to Prince Orloff, who received it from Catharine II After his death it reverted to the crown and became the favorite summer residence of Czar Paul I, who bestowed municipal rights upon the town in 1797 Gatchina is a very popular summer resort with the residents of the capital Pop, 1897, 14,735

GATE CITY. A popular name for Keokuk, Iowa, from its situation at the head of navigation on the Mississippi, and for Atlanta, Ga, which was so named by Jefferson Davis on account of the importance of its position

GATE HOUSE PRISON. A prison in Westminster, London, from which, on Oct 29, 1618, Sir Walter Raleigh was led to the scaffold in Old Palace Yard

GATE OF THE LIONS See LION GATE

GATE OF THE MEDITERRANEAN The Strait of Gibraltar, as the passage between the Atlantic and the Mediterranean

GATES, CALEB FRANK (1857–) An American Congregational missionary and college president He was born in Chicago, and graduated from Beloit (Wis) College in 1877 and from the Chicago Theological Seminary in 1881 Ordained to the Congregational ministry, he was sent under the auspices of the American Board of Commissioners for Foreign Missions as a missionary to Mardin, Turkey, Asia Minor, in 1881 From 1894 to 1902 he was president of Euphrates College at Harpoot, Turkey, and after 1903 president of Robert College in Constantinople He is author of *A Christian Business Man* (1893)

GATES, ELEANOR (1875–) An American playwright, born at Shakopee, Minn She was educated at Stanford University and the University of California While still a student she was on the staffs of the *Examiner, Call,* and *Chronicle* of San Francisco, and the *Enquirer* of Oakland, Cal In 1901 she married Richard Walton Tully, the playwright, but was divorced in 1914 She is author of *The Biography of a Prairie Girl* (1902), *The Plow-Woman* (1906), *Good Night* (1907), *Cupid, the Cow-Punch* (1907), *The Justice of Gideon* (1910), and of the play *The Poor Little Rich Girl,* the production of which in 1913 was an unusual popular and artistic success

GATES, FREDERICK TAYLOR (1853–) An American Baptist clergyman and educator He was born at Maine, Broome Co, N Y, and graduated from the University of Rochester in 1877 and from Rochester Theological Seminary in 1880 He was pastor of the Central Church, Minneapolis, Minn, from 1880 to 1888, and as corresponding secretary of the American Baptist Education Society in 1888–93 was instrumental in establishing the University of Chicago In 1893 John D Rockefeller chose him as his business and benevolent representative, he became chairman of the General Education Board and also of the Rockefeller Institute for Medical Research

GATES, GEORGE AUGUSTUS (1851–1912). An American educator, born at Topsham, Vt After graduating from Dartmouth College in 1873 he studied in Germany and at Andover Theological Seminary Ordained to the Congregational ministry, he held a pastorate at Upper Montclair, N J, from 1880 to 1887, when he became president of Iowa College This position he left in 1901 to become pastor of the First Church of Cheyenne, Wyo He was president of Pomona College from 1902 to 1909, and thereafter president of Fisk University for negro students at Nashville, Tenn His book, *A Foe to American Schools* (1897), an exposure of school-book trust methods, attracted much attention.

GATES, HORATIO (1728–1806) An American soldier, prominent in the Revolutionary War He was born at Maldon, Essex Co, England, his parents being servants in the household of the Duke of Leeds He entered the army when very young, went to America in 1755, and, as major, served under Braddock (q v) and was severely wounded at the defeat of the latter on July 9 of the same year near Fort Duquesne (Pittsburgh) In 1760 he was stationed, as brigade major, under General Monckton, at Fort Pitt (Pittsburgh), and in 1762 was Monckton's aid at the capture of Martinique Buying a farm in Berkeley Co, Va, in 1763, he lived there in retirement until July, 1775, when Congress appointed him adjutant general in the regular army, with the rank of brigadier In 1776 he was appointed to the command of the army which had lately retreated from Canada, and immediately began intriguing to supplant General Schuyler as the commander of the Northern Department. In this he was successful through the influence of the New England delegates in Congress, on Aug 2, 1777 The army under his command, after fighting the battles of Stillwater and Saratoga, forced Burgoyne to surrender on

October 17 (See SARATOGA, BATTLES OF) Gates received nearly all of the credit, though Schuyler, Arnold, and Morgan had done most of the work, and he had been conspicuous chiefly for incapacity and for an apparent lack of personal courage. Soon afterward he entered into the schemes of the Conway Cabal (q v), whose object was to have him appointed, in Washington's stead, as commander in chief For a time he was president of the newly organized board of war, but was detected in several falsehoods, became discredited, and withdrew in 1778 to his farm in Virginia, where he remained until 1780, when he was put in command of the Army of the South Owing chiefly to his wretched generalship, his forces were totally defeated near Camden, S C (q v), on August 16 by Lord Cornwallis, and on December 2 he was superseded by General Greene A court of inquiry, appointed to investigate his conduct, sat until 1782, and finally acquitted him He then again retired to his Virginia farm and lived there until 1790, when, after freeing his slaves, he removed to New York City, where he remained until his death, April 10, 1806 Personally, he was handsome, affable, and courteous, and in society was a general favorite For his part in the Saratoga campaign, consult Stone, *Campaign of Lieutenant-General Burgoyne* (Albany, 1877)

GATES, LEWIS EDWARDS (1860-) An American critic, born at Warsaw, N Y A graduate of Harvard, he became connected with that institution in the departments of English and comparative literature He won a reputation as a subtle critic, especially by his essays on Cardinal Newman, Francis Jeffrey, and Matthew Arnold prefixed to volumes of selections from their writings edited for use in colleges In 1900 appeared his *Studies and Appreciations*

GATES, MERRILL EDWARDS (1848-1922) An American educator. He was born at Warsaw, N. Y, the son of Seth Merrill Gates, graduated at the University of Rochester in 1870, and from 1870 to 1882 was principal of the Albany Academy From 1882 to 1890 he was president of Rutgers College, and from 1890 to 1899 president of Amherst He promoted civil-service reform and ballot reform, and in 1884 became a member of the United States Board of Indian Commissioners, of which he was chairman in 1890-99, and then secretary For several years he was president of the Lake Mohonk Indian Conferences He received the degree of LL D. from a number of universities Among his publications are *Land and Law as Agents in Educating the Indians* (1885), *Sidney Lanier, Poet and Artist* (1887), *International Arbitration* (1897), *The Highest Use of Wealth* (1901)

GATES, SETH MERRILL (1800-77). An American lawyer, born at Winfield (Herkimer Co), N. Y He was admitted to the bar in 1827, and in 1832 was a member of the State Assembly In 1838 he became editor and proprietor of the Le Roy *Gazette*. He was an antislavery Whig member of Congress from 1839 to 1843, the year in which he drafted the protest signed by the Whigs in Congress against the annexation of Texas In 1848 he was the unsuccessful candidate on the Free-Soil ticket for Lieutenant Governor of New York So pronounced was his hostility to slavery that a Southern planter offered a reward of $500 for his apprehension

GATES, SIR THOMAS (c.1559-c 1621) The first sole Governor of Virginia under the Virginia Company. He was born probably at Colyford, Devonshire, England, entered the military service, accompanied Sir Francis Drake on his voyage to America in 1585-96, and published in 1589 the account of this voyage written by Captain Bigges For his conduct at Cadiz Essex knighted him in June, 1596 In 1598 he entered Gray's Inn and in the following year was engaged in public service at Plymouth, but soon afterward he enlisted, together with Sir Thomas Dale (q v), in the service of the Netherlands He was one of the first petitioners for royal license to colonize Virginia and was one of the incorporators of the first Virginia charter of 1606 Having obtained a leave of absence from the States-General, he was chosen the first sole and absolute Governor of Virginia, and was placed in command, with Sir George Somers and Captain Newport, of the fleet of nine vessels, carrying 500 colonists, which sailed for America in 1609 The *Sea Venture*, carrying Gates, Somers, and Newport, was wrecked on the Bermudas, where, within the next nine months, two new vessels were constructed The story of the wreck is supposed to be one of the sources for Shakespeare's *The Tempest* Leaving the Bermudas on May 10, 1610, Gates arrived at Jamestown in May, near the close of the "starving time," and was installed with great ceremony as Deputy Governor, replacing George Percy, the retiring president of the King's Council The famished colonists clamoring to be taken from Virginia, Gates crowded them upon four small vessels and started with them for England, but was met at the mouth of the James River and turned back by Lord De La Warr (q v), who took office as Governor Gates was sent to England for a new supply of cattle, returned to Jamestown in 1611 with six ships and 300 colonists, and remained as Lieutenant Governor until March, 1614 He afterward served on one of the committees of the Virginia Company, and in 1620 was appointed by James I one of "the first moderne and present Councill established at Plymouth, in the County of Devon, for the planting, ruling, and governing of New England in America" For an account of the administration of affairs in Virginia by Gates, consult Brown, *The First Republic in America* (Boston, 1898)

GATES'HEAD. A large manufacturing town in Durham Co, England, on the south bank of the Tyne, opposite Newcastle, of which it is practically a suburb, and with which it is connected by three bridges, one 1337 feet long (Map England, E 2) The community finds employment almost entirely in the neighboring coal mines, in the Gateshead Fell quarries celebrated for "Newcastle grindstone," in the locomotive works of the Northeastern Railway, in shipbuilding yards, iron foundries, cable and wire-rope factories, tanneries, breweries, and in chemical, soap, candle, brick, cement, and glass works Here also are the works of the Newcastle and Gateshead Gas Company At Gateshead a large portion of the first Atlantic cable was manufactured The town's history dates from the Roman occupation The chief architectural features are the town hall, free library, mechanics' institute, various denominational churches, and the restored parish church of St Mary, established in the eleventh century, and in 1080 the scene of Bishop Walcher's murder by an avenging English mob Daniel Defoe's dwelling, where he wrote *Robinson Crusoe*, is in the Hillgate district The town owns a

profitable corporation quay, and maintains baths, washhouses, cemeteries, public parks, recreation grounds, and public libraries Gateshead sends a member to Parliament Pop, 1901, 109,888, 1911, 116,907 Consult Welford, *History of Newcastle and Gateshead* (Newcastle-on-Tyne, 1884–85)

GATES'VILLE A city and the county seat of Coryell Co, Tex, 45 miles west of Waco, on the Leon River and on the St Louis Southwestern Railroad (Map Texas, D 4) It is the seat of the State Juvenile Training School The city ships cotton, grain, and live stock, and has cotton gins and compress, flour, oil, and planing mills, etc Pop, 1900, 1865, 1910, 1929

GATE'WAY. The passage or opening in which a gate or large door is hung This may be either a mere opening in a wall or a covered way vaulted or roofed over It differs from a doorway in that it does not open directly into a building A monumental gateway and doorway are often both called a *portal* (q v). From the earliest ages the gateway has been considered a feature of the utmost importance, not only because of its strategic value in city walls and fortifications, necessitating its protection and defense by towers and drawbridges and other devices, but also because of its architectural significance and the opportunities it offers for impressive architectural effect In very ancient times the "gate"—i e, the chamber or passage between the outer and inner gates of a gateway in a city wall—was the place where proclamations were made, and where kings or elders administered justice This was especially the case in the Orient, where all kinds of business were transacted in the gateway Hence the modern term "The Sublime Porte" (i e, Lofty Gate) used of the Turkish government Such gateways are often mentioned in the Old Testament, and the great Assyro-Babylonian city gates, especially those of Sargon's city, at Khorsabad (q v), illustrate the texts Many of the Moorish gates of cities and fortified palaces (e g, of the Alhambra, q v) in Spain still exist, bearing significant names like "Gate of Pardon," "Gate of Justice," etc The Greek and Roman gates were frequently of great magnificence The Propylæa at Athens is a beautiful example, and the triumphal arches of the Romans were often identical with their city gates The Lion Gateway at Mycenæ and the city gates of Segni and Alatri in Italy are good examples of early Cyclopean structures before the seventh century B C Those at Ferentino, Viterbo, and Falerii show the pre-Roman arched style, those of Volterra and Perugia the later Roman-Etruscan type The Roman gates at Verona, the Golden Gateway at Jerusalem, the gates at Spalato and Benevento, and others in Gaul, Syria, Asia Minor, and North Africa show every variety of design and number of openings In the Middle Ages the city gateways were often crowned by towers of imposing architecture, especially in north Germany, as in Lubeck and Nuremberg, and the same was the case with the gateways of bridges, as at Prague, and of secular buildings, such as those of Oxford and Cambridge The castle gateways, of which many remain, have seldom any decorative character, being for defense, with flanking turrets, drawbridge (see BRIDGE), and portcullis (q v), but the monastic doorways, leading into the great inclosed courts, were often architecturally beautiful, as in the Cistercian monastery at Casamari in Italy, with its double porch, porter's lodge, and living rooms The abbey gates of Canterbury and Bury St Edmunds are well known All *closes*, whether of abbeys, colleges, law courts, guilds, fraternities, or the like, had architectural gateways The city gates of Verona, designed by Sanmichele (q v) in the sixteenth century, are dignified examples of the Italian Renaissance type after the disappearance of the mediæval form with its flanking turrets, while the gate of the Certosa at Pavia with its mosaics and the elegant gateways of many villas illustrate various nonmilitary types frequently imitated in modern work A type peculiar to modern architecture (at least since 1750) is that consisting of masonry piers, more or less decorated, between which are hung elaborate gates of wrought iron or bronze Parks, private grounds, and avenues are often entered through such gates

GATH (Heb, wine press) One of the five cities of the Philistines It was probably situated at the modern Tell el-Safiyeh (the white hill), though the Crusaders identified it with Yebna, the ancient Jamnia, and some modern scholars have adopted this view. The first mention of Gath is in the list of Palestinian towns conquered by Thothmes III, where it is referred to as Kntu (Kintu) In the Amarna letters it occurs several times as Gimti and Ginti, there being an Egyptian governor in this city in the time of Amenhotep IV Its position on the borders of Judæan territory made it of great importance in the wars with the Philistines The Philistine champion Goliath (q v) came from Gath (1 Sam xvii 4) David took refuge with Achish, King of Gath (ib xxi 10), and probably also obtained a wife in Gath It is possible that Gath was in the hands of the Israelites in the time of David Whether Solomon and Rehoboam were able to keep it cannot be determined in view of the probable late date of the statements During the wars with Assyria Gath seems to have formed a part of Ashdodite territory. Sargon mentions in the Khorsabad inscription that he besieged and conquered Gimtu, probably in the year 711 B C The absence of Gath in many passages where the other Philistine cities are mentioned may be accounted for by its being regarded as a dependency of Ashdod In the days of Eusebius and Jerome the city still existed, and the description of the site in the *Onomasticon* seems to point to Tell el Safiyeh At this place the *Blanca Guarda* was erected by Foulques of Anjou in 1144 The fortress was taken by Saladin in 1191, and recaptured and fortified by Richard in 1192 Situated on a hill 300 feet above the plain with steep walls upon three sides, it was at all times a difficult place to capture and an important stronghold There is to-day a small village on the top of the hill Consult Smith, *Historical Geography of the Holy Land* (London, 1895), and Huntington, *Palestine and its Transformation* (Boston, 1911)

GÂTHÂS, ga'thaz (Av *gāθa*, Skt., Pali *gēthā*, song) The name applied to certain metrical compositions, both in the Avesta and in Sanskrit Brahmanic and Buddhistic literature. The Gathas of the Avesta comprise 17 hymns (Yasna 28–34, 43–51, 53), which contain 232 stanzas, besides three in Yasna 27, 13–14 and Yasna 54 They are composed in five metres, which are reckoned by the number of feet, not by their quality, as in Greek and Latin These metrical schemes, which are of great antiquity,

are composed respectively of three-line stanzas of 7 + 9 (or sometimes 8) syllables (Ahunavaiti), five-line stanzas of 4 + 7 syllables (Ushtavaiti), four-line stanzas of 4 + 7 syllables (Spentamainyu), three-line stanzas of 7 + 7 syllables (Vohukhshathra), and four-line stanzas, whose first two lines have 7 + 5, and the last two 7 + 7 + 5 syllables (Vahishtoishti). The dialect in which these hymns are written differs considerably from the ordinary Avesta, and is more archaic in character If we may reason on the analogy of the Gathas of the Buddhist Jatakas (q v), where verse alternates with prose, it might be plausibly suggested that the Avesta Gathas represent but a small part of the original content of this portion of the Zoroastrian Scriptures There may have been a large amount of prose between the stanzas which has been lost The Iranian tradition ascribes the authorship of the Gathas to Zoroaster (q v) himself They are of peculiar difficulty, owing in part to the inflectional system of the Gatha-Avesta dialect, and in part to the numerous words which occur but once in them and have no representatives, so far as known, in any other Indo-Iranian or even Indo-Germanic language Their interpretation is aided, however, to a large degree, by a Pahlavi version with glosses, which was translated into Sanskrit by a Parsi priest, Neryosangh, probably about 1200 A D These versions, while important, are not altogether trustworthy, mainly on account of the decay of grammatical knowledge of the Avesta language They are, notwithstanding, indispensable in interpreting the Gathas, and mainly through their aid the meaning of the hymns is now for the most part tolerably certain

In India the term "Gatha" was employed in the Brahmanas (q v) to denote verses of religious content which did not belong to any of the four Vedas (See VEDA) It became wider in its scope in the Buddhistic literature, and denoted especially that part of the sacred canon which comprised the Dhammapada, Theragatha, Therigatha, and the pure verse sections of the Suttanipata, and also to the verses in the Jatakas It is most commonly applied, however, to the North Buddhist Lalita-Vistara (q v), composed in verse mingled with prose This work is in a dialect, probably artificial, of Prakrit words with Sanskrit terminations, and on account of this peculiarity the language of the Lalita-Vistara is often called the Gatha dialect, although prose works were sometimes written in it Consult Bartholomae, *Die Gāθā's und heiligen Gebete des altiranischen Volkes* (2d ed, Halle, 1897), id, *Die Gathas des Awesta* (Strassburg, 1905), Mills, *A Study of the Five Zarathushtrian* [Zoroastrian] *Gâthâs* (Oxford, 1892–94), id, *A Dictionary of the Gâthic Language of the Zend Avesta* (Leipzig, 1902–13), id, *The Gâthâs of Zarathustra* [Zoroaster] *in Metre and Rhythm* (Oxford, 1900), Muller, "Der Dialekt der Gâthâs des Lalitavistara," in *Beitrage zur vergleichenden Sprachforschung*, vol viii (Berlin, 1876), Jackson, *A Hymn of Zoroaster, Yasna 31* (Stuttgart, 1888), Kanza, *The Gāthās, Transliterated and Translated into Gujerati* (2d ed, Bombay, 1902), Bulsara, *God in the Gāthās* (ib, 1906), Macdonell, *History of Sanskrit Literature* (London, 1913). See AVESTA, LALITA-VISTARA, ZOROASTER

GATHORNE-HARDY, G. See CRANBROOK.

GATINEAU, ga'tē'nō' A large river of Quebec, Canada, rising in a connected chain of large lakes immediately north of the 48th parallel of latitude (Map Quebec, C 4) It flows first south-southwest, and then almost due south, and falls into the Ottawa one mile below Ottawa City The length of the river is estimated at 400 miles, it receives a number of tributaries, and is extensively used for floating down the lumber of the upper region

GAT'LING, RICHARD JORDAN (1818–1903) An American inventor He was born in Hertford Co, N C, and during his boyhood he acquired considerable skill and mechanical acumen working as his father's assistant in the perfection of a machine for sowing cottonseed. His principal invention, and the one by which he became famous, was the revolving machine gun, since known by its inventor's name In 1886 he invented a new gun metal of steel and aluminium Congress afterwards voted him $40,000 to experiment on a new method of casting cannon Among his other inventions may be noted a hemp-breaking machine and a steam plow Although a graduate of the Ohio Medical College (1850), he never practiced medicine See MACHINE GUN, ORDNANCE

GATSCHET, ga'shā', ALBERT SAMUEL (1832–1907) An American philologist and ethnologist, born at St Beatenberg, Bern, Switzerland He studied at the universities of Bern and Berlin, made investigations regarding the Swiss dialects, and published *Ortsetymologische Forschungen als Beitrage zu einer Toponomastik der Schweiz* (1865–67) and *Promenade onomatologique sur les bords du Lac Léman* (1867) In 1868 he removed to the United States, where until 1877 he was connected with the staffs of various German newspapers, and in that year was appointed ethnologist of the government Geological Survey He became linguist to the Bureau of American Ethnology in 1879 From 1874 he made extensive study of the languages of the North American Indians, in particular those of the Tonkawa, Yuma, Chumeto, Hitchiti, Creek, and Timucua tribes Among the many valuable treatises published by him, in both English and German, are *Zwolf Sprachen aus dem suduesten Nordamerikas* (1876), *Analytical Report upon Indian Dialects Spoken in Southern California, Nevada, and on the Lower Colorado River* (1876), "Classification of Western Indian Dialects," in vol vii of the *Report of the Geological Survey West of the 100th Meridian* (1879), *Volk und Sprache der Timucua* (1881), *Indian Languages of the Pacific States and Territories and of the Pueblos of New Mexico* (1882), "A Migration Legend of the Creek Indians," in No. 4 of Brinton, *Library of Aboriginal American Literature* (Philadelphia, 1884–88), and "The Indians of Southwestern Oregon," in *Contributions to North American Ethnology*, vol ii (Washington, 1890) For a further list of titles, consult Pilling, *Bibliography of North American Languages* (ib, 1885)

GATSCHINA, ga'chē-na See GATCHINA.

GATTEAUX, ga'tō', JACQUES EDOUARD (1788–1881) A French sculptor and engraver, born in Paris He was the pupil of his father, Nicholas Marie Gatteaux, and of Moitte, and won the Prix de Rome (1809) for medaling He was one of the founders of the "Galerie Numismatique des Illustrations Françaises" in Paris He was employed by the French government to strike a medal commemorative of the establishment of the School of Architecture. Others of

his famous medals are those for the "Holy Alliance" and the Peace of 1814 He was elected to the Institute in 1845, and left his art collection to the Ecole des Beaux-Arts and the Louvre His busts include those of Michelangelo, and of Rabelais, at Versailles His statue of Aimé de Beaujen is in the Luxembourg Gardens

GATTERER, gat'ēr-ēr, JOHANN CHRISTOPH (1727–99) A German historian, born at Lichtenau He studied at the University of Altdorf, and in 1759 became professor of history at Gottingen, where from 1767 he was also director of the historical institute established by himself in 1764 He was the first to introduce into the historical courses of German universities geography, diplomacy, heraldry, and other auxiliary studies The most important of his works are *Die Weltgeschichte in ihrem ganzen Umfange* (2 vols, 1785–87) and the *Versuch einer allgemeinen Weltgeschichte bis zur Entdeckung von Amerika* (1792) Consult *Elogium Gatterern*, by Heyne (Gottingen, 1800), also Wesendonck, *Die Begrundung der neuern deutschen Geschichtsschreibung durch Gatterer und Schlozer* (Leipzig, 1876)

GATTI, gat'tē, BERNARDINO (c 1495–1575), called "il Sojaro" (the Cooper) An Italian painter, born at Parma He was the pupil of Correggio and so like him in his manner that his pictures have been mistaken for that master's He also imitated Pordenone and was selected to complete the frescoes left unfinished by him in the Santa Maria di Campagna, Piacenza Gatti's works are well represented in Parma Cathedral and in the church of St Peter at Cremona His masterpiece is an altarpiece, "Madonna with Donors" (1531), in the cathedral of Pavia

GATTI-CASAZZA, gat'tē-ka-zat'sa, GIULIO (1869–) An operatic manager, born at Udine, Italy, Feb 3, 1869 He was educated at the universities of Ferrara and Bologna and completed the course in engineering at the Naval School of Engineering at Genoa As his father had been the director of the municipal theatre of Ferrara, the young man grew up in a musical atmosphere and always manifested a keen interest in theatrical affairs, so that, when his father in 1893 accepted a position in Rome, the son abandoned the proposed career of an engineer and assumed the directorship at Ferrara, which he held for five years In 1895 he was chosen director of La Scala in Milan During the 10 years of his incumbency he raised that institution to the rank of the foremost opera house of Italy In 1908 he became the general manager of the Metropolitan Opera House of New York Here he found the widest field for the display of his extraordinary administrative ability Under his régime the already famous institution entered upon the period of its greatest prosperity, financial and artistic The achievements in every department approach almost ideal standards From the very beginning of his administration Mr Gatti-Casazza followed the policy of encouraging native singers and of producing every year one new opera by an American composer In 1910 he took the entire Metropolitan company to Paris, where it created a veritable furore because of its perfect ensemble He married, in 1910, Frances Alda (q v), one of the prima donnas of his company

GAT'TY, MRS. MARGARET (1809–73). An English novelist She was born in 1809 and in 1839 married a clergyman and passed most of her life after marriage at Ecclesfield in Yorkshire, becoming widely known by *The Fairy Godmothers* (1851) and *Parables from Nature* (five series, 1855–71), translated into the leading languages of Europe In 1866 she started a monthly periodical for young people, called *Aunt Judy's Magazine*, which after her death, in 1873, was continued by her daughters till 1885 Here first appeared nearly all the stories of her daughter, Mrs Juliana H Ewing (q v) Consult *Parables from Nature* (New York, 1912), which contains a memoir by her daughter, Juliana H Ewing

GATUN. See DAMS AND RESERVOIRS, PANAMA CANAL

GAU, gou (Ger, district) In the earliest German times used for 1000 men, then transferred to the territory occupied by them Later used indefinitely for a district, frequently it was identical in the Middle Ages with a county, or Grafschaft, but sometimes with a portion of a county In the early period of the migrations the ruler of a gau was frequently designated as king Consult Schroder, *Lehrbuch der deutschen Rechtsgeschichte* (Leipzig, 1907)

GAUBIL, gō'bēl', ANTOINE (1689–1759) A French Jesuit missionary to China, born at Gaillac He became a Jesuit at the age of 15 and in 1723 was sent to China, where he learned Chinese and Manchu with wonderful facility His scholarship won him a place at court, in spite of the Emperor's aversion to the missionaries, and his influence kept the Jesuits from being disturbed He was made interpreter and carried on diplomatic correspondence with Russia, besides being head of the Imperial Colleges under Kien Lung when he succeeded Yung Ching He was a correspondent of the Paris Academy of Sciences and a member of the Academy of St Petersburg Père Gaubil died in Peking He wrote *Histoire de Gentchiscan et de toute la dynastie des Manchoux* (1739), *Traité de chronologie chinoise* (1814), and a translation of *Le Chou King* (1771), besides many letters and sketches published in *Lettres édifiantes* and in Rémusat, *Nouveaux mélanges asiatiques.*

GAUCHOS, gou'chōz (countrymen). Pastoral nomads of the Chaco, in the Argentine Republic, South America, offspring of whites and Indians of the pampas They are tall and handsome, with a proud and dissolute expression of countenance They wear mustaches and have long black hair hanging down their backs Their costume is brightly colored They are very polite and possess high ideas of their own equality and dignity. These hybrids can scarcely be traced to their original Guayeuru Indian components, but since the white infusion has ceased, the people are reverting to the Indian type, thus showing a most interesting example of the formation of a new race The free, wild life of the pampas has developed the Gauchos into an alert, vigorous people, expert horsemen and cattlemen, who wield the lariat with great skill. The bolas (q v) is also employed in the chase and in warfare

The Gauchos eat meat exclusively for months together, and with it a large proportion of fat. It has been observed that they dislike dry meat. Curiously enough, they do not eat salt The men are proficient in leather working, and the women weave belts and dress skins Consult Sir Edmond Temple, *Travels in Various Parts of*

Peru (London, 1830), and W H Koebel, *Modern Argentina* (Boston, 1912)

GAU'DEA'MUS (Lat, Let us rejoice) The first word and the title of a well-known Latin student song popular in Germany and America It is based partly on a Latin song dating from 1267 and existed in the eighteenth century in a somewhat obscene form, with German as well as Latin verses The present version dates from 1781.

GAUDEN, gą'den, JOHN (1605–62) An English prelate and author He was born at Mayland, Essex, where his father was vicar After education at Bury St Edmunds, he entered St John's College, Cambridge, and obtained the degrees of B A and M A While a tutor at Oxford he took the degree of B D at Wadham College in 1635 and D D in 1641 His pupil, Sir Francis Russell, presented him with the living of Chippenham in 1640, and the same year he was the appointed preacher to the House of Commons After the Restoration, in 1660, he was appointed Bishop of Exeter and in 1662 was translated to the bishopric of Worcester. He died four months later (Sept 20, 1662) His publications number some 13 or more books, which appeared between 1642 and 1660 At first he was inclined to the Parliamentary cause, but in the end he strongly opposed the Puritan excesses Among his more forcible writings may be mentioned *Cromwell's Bloody Slaughter House, or, His Damnable Designs in Contriving the Murther of His Sacred Majesty King Charles I Discovered* (1660) He is best known on account of the controversies which have raged over the authorship of *Eikon Basilike*, a book attributed to Charles I himself It was published immediately after the execution of the King, and, according to Malcolm Laing, "had it appeared a week sooner, it might have saved the King's life." The Bishop claimed its authorship in correspondence with Chancellor Hyde, Lord Clarendon (1660–62), and Clarendon admitted it Burnet in 1674 stated that the Duke of York told him that Dr Gauden was the author, and in November, 1686, at the sale of the Marquis of Anglesey's choice library of books, the "famous memorandum" was found in the peer's copy of the *Eikon Basilike*—"King Charles II and the Duke of York have both assured me that this work was none of the King's compiling, but made by Dr Gauden, Bishop of Chester (?), which I here insert for the undeceiving of others in this point, by attesting so much, under my hand" A sharp controversy arose, which has been revived on various occasions up to as late as 1880 In *Who Wrote Icon Basilike?* (3 vols, 1824–28), Dr Christopher Wordsworth "proves" that the King did. Sir James Mackintosh, reviewing Wordsworth's book in the *Edinburgh Review* (xliv), "proves" that Gauden wrote it Macaulay, Guizot, and other historians sustain Gauden's claim Consult Almach, *Bibliography of the King's Book* (London, 1896) See EIKON BASILIKE

GAUDRY, gō'drē', ALBERT (1827–1908) A French paleontologist, born at Saint-Germain-en-Laye In 1853 he traveled in the Orient and from 1855 to 1860 in Greece, where he was occupied with paleontological researches He was then appointed assistant naturalist in the Museum of Natural History in Paris, where in 1872 he became professor In 1882 he was elected a member of the French Academy of Sciences. His works include *Recherches scientifiques en l'Orient* (1855), *Animaux fossiles et géologie de l'Attique* (2 vols, 1862–67), *Animaux fossiles du Mont-Léberon*, with Fischer and Tournouer (1873), *Enchaînements du monde animal dans les temps géologiques* (1878)

GAUDY, gou'dē, FRANZ BERNHARD HEINRICH WILHELM, BARON VON (1800–40) A German author, born in Frankfort-on-the-Oder In 1818 he entered the Prussian army, but resigned from the service in 1833 to follow a wholly literary career, and at Berlin was a friend of Chamisso, with whom he edited the *Deutscher Musenalmanach* for 1839 His best-known work is his humorous and frequently epigrammatic verse, especially his *Kaiserlieder* (1835) in honor of Napoleon Some of his poems became widely popular Of his prose writings, *Tagebuch eines wandernden Schneidergesellen* (1836), *Venezianische Novellen* (1838), *Der Katzenraffael*, and *Jugendliebe* are still read in Germany His complete works appeared in 1853 (8 vols, ed. by Arthur Muller)

GAUERMANN, gou'ĕr-man, FRIEDRICH (1807–62) An Austrian genre, landscape, and animal painter. He was born at Miesenbach, Lower Austria, Sept 20, 1807, a son of the landscape painter Jakob Gauermann He was a pupil of his father at Vienna, and in copying the old masters he acquired the technique of the Dutch school, modified by the smooth, delicate handling of the Viennese In summer he made studies of the landscapes and peasants of the Austrian and Styrian Alps His landscape motives are poetic in conception, his representations of wild animal life dramatic and spirited, and his rough idyls of the mountaineers show keen observation of local peculiarities He first attracted attention at the Vienna Exhibition in 1824 "The Storm" (1829) assured his reputation, and the "Field Laborer" (Vienna Gallery) was one of the sensations in the Exhibition of 1834 The Vienna Academy possesses a series of charming studies of animals and four paintings, including "Peasants Resting" Among the most important of his other works are "Vultures Hovering over a Wounded Deer", "Husbandmen Ploughing"; "Cows, Sheep, a Horse" (Leipzig Museum), "Rural Smithy"; and "Well in the Tyrol" (Berlin National Gallery). He was made member of the Munich Academy in 1836 Gauermann left at his death, which occurred at Vienna, July 7, 1862, more than 1000 oil paintings, about 565 drawings, and 15 unfinished pictures

GAUGE, gāj (from OF. *gauge, jauge*, connected with ML *gaugatum*, gauging of a wine cask, *jalagium*, right to gauge wine casks, and probably with *jalea*, gallon, OF, Fr. *jale*, bowl). In mechanics, an instrument for determining the dimensions, quantity, force, capacity, etc, of anything Gauges are of various forms and are employed for numerous purposes in engineering and the arts Gauges to secure precision in the dimensions and forms of manufactured articles are made of hardened steel, or of case-hardened wrought iron, formed to the exact outline to be secured and accurately dimensioned Such gauges are extensively used in machinery manufacture where interchangeability of corresponding parts is sought Wire gauges are circular disks of hardened steel, having round the edge a series of notches of different sizes of openings corresponding to the standard wire sizes of the Birmingham or other gauges, such as the American or Brown and Sharpe In the Birmingham

wire gauges the sizes run from No 1, denoting a wire diameter of 0 3 inch, to No 34, denoting a wire diameter of 0 004 inch Similar gauges are used for measuring the thickness of metal plates, and in the United States a standard gauge for sheet and plate iron and steel was established by Act of Congress in 1893, the corresponding numbers being defined both in metric measure and fractions of inches The modern tendency in design in many large manufacturing works is to state the actual dimensions in thousandths of an inch or in millimeters rather than by gauge

Pressure gauges for measuring the pressure of steam or other gas inside a closed vessel are familiar to all In the most usual form the pressure of the gas acts to cause a pointer to move around a graduated dial The steam-boiler gauge is a familiar example of such devices Wind gauges are arrangements by which the wind blowing against a plate diaphragm actuates a recording device which records the pressure (See ANEMOMETER) Water gauges consist of a strong glass tube with metal fixtures at its ends, which connect the tube with the interior of a steam boiler The lower end of the tube connects with the boiler below the lowest water line, and the upper end connects with it above the highest water line, and the level of the water between the two points is observable by the height at which it stands in the glass

Screw gauges consist of a U-shaped frame of steel, at the end of one arm of which is a steel plug pointing towards the opposite arm, through whose end runs a finely threaded thumbscrew with a graduated head To measure with this device the end of the plug is brought into contact with one side of the object, and the screw run out into it touches the other side, a reading of the graduated head shows the distance apart of the end of the plug and the end of the screw, and therefore the thickness of the object See CALIPERS, RAILWAYS

GAUGER. A United States customhouse officer whose duty is to gauge or measure casks and other hollow vessels containing liquids liable to duty Local officers are to be found in many States also, whose duties are of a similar nature These are often known as sealers of weights and measures

GAUGUA, gou′gwa See GUAGUA

GAUGUIN, gō′găn′, PAUL (1848–1903) A French figure and landscape painter, one of the pioneers of the post-Impressionist movement. He was born at Paris, June 17, 1848, the son of a journalist of Orléans (not Breton) descent and of a Peruvian mother. The lad was brought up at Lima and in the house of his grandfather at Orléans In 1865 he went to sea, returning in 1871 He then took up successfully a banking career and was married to a cultivated and sympathetic Danish lady Painting was for him a hobby to occupy leisure evenings and Sundays Forming the acquaintance and acquiring the friendship of Pissaro, he worked with the Impressionist group, becoming the most radical of them all He soon achieved a reputation with his simple and forceful presentation of rocky Breton landscape and became founder of the school of Pont Aven He then passed considerable time with Van Gogh (q v) in southern France, painting the landscape and figures of that country Among his notable paintings of this period are his well-known portrait of himself and the curious "Yellow Christ," so called from the prevailing tone of the painting Disgusted with the civilization of Europe, he went in 1891 to Tahiti, where he lived like a native until 1893 While there, he painted a remarkable series of Tahitan subjects, which, exhibited with Maori titles, caused quite a sensation in Paris The most remarkable of them were brown nudes in bright tropical landscapes, such as "Te Arii Vahine," also called the "Maori Venus," and "The Spirit of the Dead" There were also fine portraits, like the two "Maori Women," besides interesting still life and sculptures—"A Maori Woman" in stone and his own characteristic head in wood He was well represented in the International Exhibition held at New York in 1913 The Luxembourg Museum possesses a "Still Life" by him, the Copenhagen Museum, his "Jardin de Paris" In 1895 he returned to Tahiti, and died on May 9, 1903, in the Isle of Dominique Gauguin rejected all dogma in art and claimed the liberty for every one to interpret nature according to his own temperament Although, according to the accepted standards, his art lacks beauty both in line and in color, it has an indisputable decorative quality of its own He also produced some good lithographs and water colors, and in conjunction with Charles Morice he published an interesting booklet entitled *Noa Noa* (1897) Consult De Rotonchamp, *Paul Gauguin* (Weimar, 1906)

GAUL, gąl (Lat *Gallia*) The name given by the Romans to that portion of western Europe which is in the main identical with France, although extending beyond the bounds of the modern state In the earliest times this region, bounded by the Atlantic, the Rhine, the Alps, the Mediterranean, and the Pyrenees, was inhabited by the Gauls, who had overrun the territory and had brought under control the earlier peoples, such as the Ligurians, along the southern coast line, and the Iberians, who had subjugated the southwestern section and are represented by the Basques of modern days (See IBERIANS, LIGURIA, LIGURIAN, BASQUE, BASQUE RACE) The Greeks founded Massilia (Marseilles), a Phocæan colony, about 600 B C They called the people Κελται, either, as Thierry suggests, extending the name of one tribe to the entire race, or using a generic term to indicate the collective Celtic people Later the Greeks named the country Γαλατία, and the Romans spoke of the Galli and of Gallia These words are cognate with the native title *Gaeltachd*, which means 'the land of the Gauls,' and which designated the territory above defined, but did not include the two islands known as Albion (q v) or Albin, the White Island, and Erin (*Eri* or *Iar* = the West), the Isle of the West, which were inhabited by the same race

Julius Cæsar is the first writer who enlightens us in regard to this people He speaks of Gaul as being divided among three peoples—the Belgæ, the Aquitani, and the Galli (or, "as they are known in their own tongue," Celtæ). The Belgæ dwelt on the north, with the Seine as their southern boundary, the Aquitani lived in the south, between the Garonne and the Pyrenees, the Celtæ dwelt between the Belgæ and the Aquitani They differed in language, customs, and laws This description is substantially correct, although Cæsar does not mention all the races of Gaul, nor does he recognize the fact that the Aquitani were really distinct in race from the Belgæ and the Celtæ, who were closely related to each other. The Aquitani were Iberian in

stock, and this racial difference was indicated by marked differences in temperament and physical characteristics The Gauls were tall, of light complexion, sociable in disposition, given to fighting in large numbers, while the Aquitani were dark, reserved in disposition, and fond of fighting in small bands—traits which are found among the Basques to-day

Cæsar mentions numerous tribes belonging to the three nations distinguished by him Such were, in Celtic territory, the Helvetii, the Sequani, and the Ædui along the Rhône and the Saône, and the Arverni (modern Auvergne) among the mountains (Cevennes), along the Loire were the Namnetes, the Senones, and the Carnutes, and between the Loire and the Seine the Armorican or maritime tribes, such as the Veneti. The Bellovaci, Suessiones, Nervii, and Morini were tribes of the Belgæ

The part the Gauls played in the ethnic distribution of the early peoples of Europe was remarkable In their nomadic history they wandered far and wide throughout Europe, Asia, and Africa. From their home in western Europe they spread to Britain, invaded Spain, swarmed over the Alps into Italy, and, extending their conquests to the Tiber, burned Rome (390 B C, see ALLIA; BRENNUS, 1, CAMILLUS, ROME, *History* For later invasions of Italy by the Gauls, see MARIUS, CIMBRI) Other tribes of Gaul traversed eastern Europe and Asia Minor, ravaged Macedonia and Thessaly, passed through Thermopylæ, and pillaged Delphi In 241 B C, meeting with Attalus, King of Pergamus, they were driven back into the mountain district near the Halys River, and there they established the independent principality of Galatia (q v), or Gallo-Græcia, which became a power among the peoples of Asia This represents the first period of their history. The second is the history of their settlements in various parts of the world and the development of their peculiar institutions, influenced as they were by environment and modified by the introduction of foreign elements Thus, in Phrygian Galatia the Gallic civilization was combined with those of Greece and Phrygia, and in Italy their manners and customs were affected by their contact with the Romans Finally, in the struggle to maintain their freedom, they met the Romans on every side. As Thierry says "The Gauls and Romans followed each other over the earth to decide the old quarrel of the Capitol" It was the long conflict between a ferociously active but undisciplined people and the sturdy, disciplined prowess of the Romans The northern part of Italy, because of the early invasion of the Gauls, was termed by the Romans Gallia Cisalpina, i e, "Gaul this side of the Alps," as viewed from Rome. (For these invasions, see ROME, *History*, under the heading *From the Abolition of the Decemvirate to the Defeat of the Samnites, etc*, subdivision 2, *External History*) This territory was also known as Gallia Citerior, to distinguish it from Gallia Transalpina or Gallia Ulterior Here the contest was waged for centuries, the Romans gradually pushing their sway up to the Alps and establishing colonies in the Gallic towns. Julius Cæsar gave its inhabitants Roman citizenship (49 B C), in 42 Gallia Cisalpina was definitely merged with Italy In this territory were born VERGIL, CATULLUS, LIVY, PLINY THE ELDER, and PLINY THE YOUNGER

Then the Romans passed over the Alps, invited by the people of Massilia, who sought assistance against their neighbors, but the invaders did not cease to interfere with the affairs of southern Gaul until the entire region from the Alps to the Pyrenees became a Roman province This was known as Gallia Provincia (Provence), and Narbo became the capital city The wars of Julius Cæsar, which ended with the eighth campaign, in 50 B C, in the conquest of Gaul, resulted in the formation of a new province, Aquitania To this province was given the name Gallia Comata, or Long-haired Gaul, just as Cisalpine Gaul had been termed Gallia Togata, and the old province Gallia Braccata, from the word *braccæ*, meaning the trousers (breeches) worn by the people The third period in the history of Gaul dates from the time of Augustus, for in 27 B C Augustus organized the peoples of Gaul in four provinces—Gallia Narbonensis, the old province, Aquitania, with the Liger (Loire) as the northern boundary (larger by 14 tribes than the Aquitania of Cæsar), Gallia Lugdunensis, named from the town of Lugdunum (Lyons), between the Loire, the Seine, and the Saône, and Gallia Belgica, between the Seine and the Rhine, with the North Sea as the northern boundary This division was not changed until the fourth century, when Gaul was divided into two great dioceses, the *Diœcesis Galliarum* and the *Diœcesis Viennensis* The former was subdivided into eight provinces and the latter into seven provinces The Emperor Claudius did much towards the complete Romanization of Gaul, and later emperors completed what Augustus had begun In the history of the Imperial period the Gauls had an important part, their fortunes rose and fell with the fortunes of the Roman people See ALESIA, AQUITANIA, ARLES, AUTUN, BELGÆ, NÎMES, CÆSAR, GAIUS JULIUS, HELVETII, CELTIC LANGUAGES, CELTIC PEOPLES, ITIUS PORTUS, ORANGE, DRUID

In the many contests of later Imperial times their land was the scene of fierce conflicts, and when the races of the north and east fought and overcame those of the south, their land was traversed again and again by great migrations of the Burgundians, the Goths, and the Franks, until out of the ruin there arose a new empire, and the history of mediæval and modern Europe began See FRANCE

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GAUL, ALFRED ROBERT (1837–1913) An English organist and composer, born at Norwich He studied under Zechariah Buck, organist of Norwich Cathedral, from 1854 to 1859 was or-

ganist at Fakenham (Norfolk), and in 1859 was appointed organist of St Augustine's (Edgbaston), Birmingham His works include an oratorio, *Hezekiah* (1860), two sacred cantatas, *Ruth* (1881) and *The Holy City* (1882), the latter of which has been very popular in the United States, a *Passion Service* (1882), an historical cantata, *Joan of Arc* (1887), *The Ten Virgins* (1890), *Israel in the Wilderness* (1892), *Una* (1893), and anthems and part songs

GAUL, GILBERT WILLIAM (1855–1919) An American historical and genre painter, born at Jersey City, N J He studied under J G. Brown and was a pupil of the National Academy of Design, of which he became a member in 1882 He painted many genre pictures, such as "Indian Girl" (1880), "Old Beau" (1881), but is at his best in his battle pictures of the Civil War, which are characterized by clever coloring, notable dash and spirit, and great truthfulness of detail Among the best are "Charging the Battery," "Saving the Colors," "Battery H in Action" (Toledo Museum), "Exchange of Prisoners" (Democratic Club, New York) Among his more recent paintings are "Golden Prospects" (1910), "Sioux Indian" and "Loot" (1911), "Ration Day" and the "Peace Conference" (1912)

GAULEY (gä'lē) **MOUNTAIN** A ridge in Randolph and Pocahontas counties, W Va, having a maximum altitude of about 4000 feet The name is also applied to a lower ridge (1500 to 2000 feet) in Fayette Co, W Va, between the Gauley and New rivers, forks of the Kanawha River

GAULEY RIVER. A river rising in the Gauley Mountains, Pocahontas Co, W Va After a southwest course it unites with New River at Gauley Bridge, to form the Great Kanawha, a tributary of the Ohio

GAULIN, gō'lăn' (West Indian name) In Jamaica and the West Indies, a heron

GAULS See GAUL

GAULT A division of the Cretaceous system of England separating the Lower and Upper Greensands It consists of a dark, plastic clay, sometimes sandy or marly, and attains a thickness of from 100 to 300 feet It is exposed along the southeastern coast of England, one of the best sections being near Folkestone

GAULTHE'RIA (Neo-Lat nom pl, from *Gaultier*, a Canadian physician) A genus of low or trailing shrubs, belonging to the family Ericaceæ, a number of species of which occur in North and South America, Asia, Australia, and Tasmania Among the best-known is *Gaultheria procumbens* (wintergreen, q v, or checkerberry), a common plant in evergreen woods from Canada to Georgia, especially in the mountainous districts at the south It is also called teaberry, deerberry, boxberry, partridge berry, and mountain tea The stems are trailing, with ascending tips, which bear the dark-green, smooth leaves and the scarlet berries The foliage has the same flavor as that which characterizes the sweet birch (*Betula lenta*) The whole plant contains a volatile oil, oil of wintergreen, which is obtained by distillation This oil is used to some extent in medicine as a stimulant, antiseptic, and diuretic, but its chief use is as a flavor Other species, especially the Asiatic, are used as a source of the flavor *Gaultheria shallon*, found from Alaska to California, is a shrub 2 or 3 feet high It is known as "salal," and its black berries are edible The fruits of wax cluster (*Gaultheria hispida*) and *Gaultheria antipoda* of Tasmania are edible, those of the latter being considered the better

GAULTHERIA

GAULUS See GOZO

GAUNT, JOHN OF See JOHN OF GAUNT

GAUNTLET, or **GANTLET,** gant'lĕt (OF *gantelet*, dim of *gant*, glove, from ML *wantus*, glove, from Dutch *want*, OSwed *wante*, glove, mitten) In mediæval armor, a glove usually of leather covered with iron, which formed part of the equipment of knights and men at arms The back of the hand was covered with scale-work of plates joined together, so as to permit the hand to close Gauntlets were introduced about the middle of the thirteenth century They were often thrown down by way of challenge, like gloves They were frequently used in heraldry, the fact of their being for the right or left hand being expressed by the words "dexter" or "sinister" Consult Demmin, *Arms and Armour* (London, 1877)

GAUPP, goup, ERNST (1865–1917) A German anatomist, born in Beuthen, Upper Silesia, and educated at Jena, Konigsberg, and Breslau At Breslau in 1889–95 he was an assistant in the university and taught anatomy in the art school He then went to Freiburg and in 1897 to Konigsberg, where he became professor and (in 1912) director of the Anatomical Institute He revised Ecker's *Anatomie des Frosches* (1896–1904), wrote "Entwicklung des Kopfskelets" (1905), in Hertwig's *Handbuch der Entwicklungslehre*, and contributed the chapter "Morphologie der Wirbeltiere," in *Kultur der Gegenwart*

GAUR, gour, or **GOUR.** The mediæval capital of Bengal, situated on the arm of the Ganges called the Bhagirathi, in lat 24° 52′ N and long 88° 10′ E According to tradition, the city was founded in the twelfth century by Lakshmanasena of the Vaidya dynasty of Bengal, who called it, after his own name, Lakshmanavati, or, in the vernacular, Lakhnauti Lakhnauti continued for the most part to be the seat of rulers who governed Bengal and Behar, sometimes as confessed delegates to the Delhi sovereigns, sometimes as practically independent kings It was conquered by the Mohammedans in 1198, and from the year 1338, with the waning power of the Delhi dynasties, the Kingdom of Bengal acquired a substantial independence which it retained for more than two centuries. One of the earliest of the kings during this period, by name Ilyas Shah, transferred the seat of government (c 1350) to Panduah, a place about 16 miles north by east of Gaur After some occasional oscillation the residence was again (c 1446) transferred to Gaur by Nasr ud-Din Mahmud Shah I, by which name the city is generally known thenceforward, that of Lakhnauti disappearing from history On account

of its somewhat unhealthful situation Suliman Kirani (1564–65) abandoned Gaur for Tandah, a place somewhat nearer the Ganges Mu'umin Khan, a general of Akbar, when reducing these provinces in 1575, was attracted by the old site and resolved to readopt it as the seat of local government But a great pestilence (probably cholera) broke out at Gaur and swept away thousands, the general in chief being himself among the victims Gaur cannot have been entirely deserted, for the Nawab Shiya ud-Din, who governed Bengal 1725–39, built a new gate to the citadel The city is now in ruins, its remains being scattered over a vast area Consult Ravenshaw, *Gaur Its Ruins and Inscriptions* (London, 1878), Ferguson, *History of Indian and Eastern Architecture* (ib, 1876, 2d ed, 1910), *Reports of the Archæological Survey* (Bengal, 1900–04), Havell, *Indian Architecture* (New York, 1913)

GAUR, gar *or* gour (Hind, from Skt *gāura*, white) A wild ox (*Bos gaurus*) of India, probably the largest existing species of wild cattle, and the one hunted by Indian sportsmen under the misnomer "Indian bison" An old bull may stand 6 feet high at the withers, and specimens have been recorded whose horns measured 39 inches and had a basal circumference of 19 inches, but the average is less than this, the cow is in every way smaller The animal is massively built, with regularly upward-curving yellowish horns decidedly flattened at their base, and has a distinct ridge above the shoulders produced by great upstanding spines of the vertebræ The ears are very large, the dewlap inconspicuous, and the tail comparatively short In color, old bulls are dark brown, sometimes nearly black, with the crown of the head and the muzzle gray, and the lower parts of the legs pure white. The hair is fine and glossy This grand animal is to be found in small bands throughout all the forested parts of India (except Ceylon) to the foothills of the Himalayas, and thence through the hilly districts of Assam and Burma down into the Malay Peninsula, where there are two forms—one called *sladong*, and the other *sapio*, in *Proceedings of the Zoological Society of London* (London, 1899) It roams widely, but keeps to the jungle and is so alert and cunning in escape, and so formidable when brought to bay, that its chase is justly regarded as among the finest sports with a rifle in the world, and among the most dangerous, as it must always be pursued on foot An old bull makes an even match for the tiger himself Nevertheless, it is not pugnacious and rarely or never attacks human beings except when wounded or brought to bay, but shyly retreats from man whenever possible These cattle have not been domesticated, except partially by some semiwild hill tribes east of the Ganges in company with their gayals, who keep them as food Consult books of natural history and sport in India and Burma, especially Sanderson, *Thirteen Years among the Wild Beasts of India* (London, 1893), noting that most of these writers call the animal "bison", also Blanford, *Fauna of British India Mammals* (2 vols, ib, 1888–91), id, "On the Gaur and its Allies," in *Proceedings of the Zoological Society of London* (ib, 1890) Cf GAYAL, and see Plate of CATTLE, WILD

GAURISANKAR, gou'rĭ-săn'kēr, MOUNT See EVEREST, MOUNT.

GAUSS, gous, KARL FRIEDRICH (1777–1855) A German mathematician, one of the most brilliant mathematicians of modern times He was born at Brunswick, the son of a day laborer After three years (1792–95) in the Carolineum at Brunswick, he went to the University of Gottingen, where he remained from 1795 to 1798, devoting all of his attention to mathematics When at Gottingen, he was already in possession of the idea of least squares (see LEAST SQUARES, METHOD OF), and in March, 1796, he discovered the proposition that a circle can be divided into 17 equal arcs by means of elementary geometry, the first extension of the ancient Greek knowledge in this particular During his university career at Gottingen he also worked upon his *Disquisitiones Arithmeticæ* (1801, 2d ed, 1889) a treatise which soon brought him into prominence before the scientific world The German astronomers being unable to locate the planet Ceres, discovered by Piazzi at Palermo, Jan 1, 1801, Gauss invented a new method for calculating the position of heavenly bodies, and thus enabled Zach (Dec 3, 1801) and Olbers (Dec 4, 1801) to rediscover the planet His *Theoria Motus Corporum Cœlestium* (1809), vol vii of his *Werke* (1871, German by Haase, Hanover, 1865), completely established his reputation, so that Laplace recognized him as the first mathematician in Europe The latter part of his life was devoted largely to two branches of applied mathematics, geodesy and electricity, he measured the meridian from Altona to Gottingen (1821–24), and he may be considered as the founder of the mathematical theory of electricity With Weber he established telegraphic connection between the magnetic and the astronomical observatories at Gottingen (1833) and published the *Resultate aus den Beobachtungen des magnetischen Vereins* (6 vols, 1838–43) and the *Atlas des Erdmagnetismus* (1840) He also wrote on the theory of surfaces, least squares, and other subjects of mathematics, physics, and astronomy His collected works were published by the Gottingen Academy (vols i–vi, Gottingen, 1862–74, vol vii, Gotha, 1871, 2d ed, 8 vols, Gottingen, 1870–1900) For his life, consult Schering (ib, 1887)

GAUSSEN, gō'saN', LOUIS (1790–1863) A Swiss Protestant theologian He was born in Geneva and in 1816 became pastor of Satigny, near that city He held strongly to the old Calvinistic teachings and refused to use a new and revised catechism which had been substituted for Calvin's For this he was censured by the majority of the Geneva ministers and in 1832 was deposed by the consistory In the same year, with Merle d'Aubigné and Galland, he formed the "evangelical society" for the circulation of Bibles and tracts In 1836 he became professor of theology in the new evangelical school at Geneva He held to the verbal inspiration of the Scriptures in its most extreme form Among his works translated into English are *Theopneustics* (1841), his most widely known work, *It is Written* (1856), *Lessons for the Young on the Six Days of Creation* (1860), *Canon of Scripture* (1862)

GAUTAMA, gou'ta-ma The name of a family, the Sākyas of Kapilavastu, and of several individuals known in connection with the early Vedic literature of India This appellative is a patronymic from Gotama and was borne also by Buddha (See GOTAMA) It was especially preserved also as the name of an early

Hindu teacher or lawgiver, the author of a work known as the *Institutes of Gautama* These legal aphorisms, like the institutes of Apastamba, Baudāyana, and Vasishta (q v), are important in connection with early Hindu law For a translation, consult "Sacred Laws of the Aryans," in Muller, *Sacred Books of the East*, vol ii (2d ed, Oxford, 1897), and Macdonell, *History of Sanskrit Literature* (London, 1913)

GAUTAMA BUDDHA, gou'ta-ma bood'a The great religious teacher and reformer of early India His name is variously given Its form as Gautama (q v) was a common appellative in ancient Sanskrit and appears in Pali as Gotama It was a family designation, and for this reason the title "Gautama Buddha" is sometimes given in English as "Buddha the Gotamid, or of the Gautama family" Often he is called Sākya-muni (Sage of the Sākya Clan), as he was descended from this tribe, and frequently he is styled Siddhārtha, or, in Pali, Siddartha (the one who successfully attains his aim) The designation "Buddha" is an epithet and signifies the "Enlightened One" Similarly Bodhisatva, or Pali Bodhisatta, means "one who possesses the verity of knowledge," and it is an attribute applied to each of a long line of Buddhas who have reached or will attain to perfect enlightenment and wisdom

Buddha was born in the sixth century before the Christian era, but the precise date is not known His home was in the region of India to the northeast of Benares, and the town where he was born was Kapilavastu, modern Kohāna, not far from the borders of Nepal Tradition states that he was born in a garden sacred to the goddess Lumbinī, and it is likely that the very place which the faith at least hallowed as his birthplace was discovered in 1897 by Alois Fuhrer, but so many inaccuracies were connected with his identification of the column of Asoka, which marked the spot, that some discredit has been thrown on the authenticity of the identification

The name of Buddha's father is given in the sacred texts as Suddhodana, a chief of the Sākyas, and his mother is known as Māyā in the Buddha-vamsa It is generally thought that he was a prince of the royal blood, but this statement is not found in the oldest documents For that reason doubt has, perhaps wrongly, been raised on this particular point However that may be, the consensus of opinion is agreed that Siddhārtha's mother died when he was but seven days old, and that he was intrusted to the care of her sister, Mahā-Prajāpati, of the Gotamid family, who was also a wife of Suddhodana We know little that is authentic regarding his youth and education, but later tradition has woven a garland of legend about his youthful attainments and achievements, his talents and his virtues A reflex of these Oriental descriptions may be gained from Sir Edwin Arnold's romantic poem *The Light of Asia*

Prince Siddhārtha, if so we may style him before he attained to Buddhahood, was very early married to his cousin, the daughter of the Rajah of Koli, and had a son named Rāhula, born some 10 years after his marriage It was shortly after the birth of this son, in his thirtieth year, when he had fulfilled the obligation which the Hindu creed required to be discharged to one's ancestors, that he left his wife, child, home, and kingdom, and wandered forth to take up the life of an ascetic This was the method of procedure that the Brahman faith authorized, this was the manner of seeking the path of salvation Finding his way to Rājagriha, he devoted himself to such rigorous and excessive asceticism that he nearly lost his life Discovering that all this was idle and futile for him, he gave himself up solely to thought and meditation, which gradually led him to evolve his religious and philosophic theory of the general existence of evil, its origin and its eradication The place where the light dawned upon his soul is still pointed out He was seated beneath a pipal tree near the village that is now known as Buddh-gaya, to the southeast of Benares The tree has ever since been sacred as the Bo tree (q v) The emancipation of his spirit found expression in rhythmical stanzas, and he enjoyed at that moment, even while alive, the perfect peace of Nirvāna To his enlightened eyes the cause of misery and sorrow was desire; the only relief was to pluck from the heart this lust, and to achieve this he pointed out the Eightfold Path of truth and right See BUDDHISM

After attaining the Buddhaship he proceeded to find the five ascetics with whom he had been associated in his recluse life near Benares He wished to impart first to them the newly won joy and the solution of life's problems, after that to his family, kinsmen, countrymen, and to all mankind Wandering up and down the Ganges region, the Holy Land of India, he continued to preach, and, in parable, precept, and practice, to impart the tenets of redemption The purity of his life, the gentleness of his manner, the earnestness of his teaching, and the firmness of his conviction, won thousands upon thousands to accept his simple creed and "take refuge in Buddha" Even during his lifetime his doctrines spread widely through India, and they became established in Ceylon hardly less than two centuries after his death There is even a tradition, though not generally accepted, that Buddha himself twice visited the island See BO TREE, CEYLON

Much of Buddha's time was spent in founding monastic orders and in developing lines along which the religion was destined in the future to grow His life was a long one, 80 years, more than twoscore of which were devoted to his ministry The time of his death is believed to have been about 480 B C, but some latitude must be allowed for inaccuracy in the deductions The place where he died was near Kusinagara, some 80 miles to the east of his birthplace, and about 120 miles to the northeast of Benares A detailed account of the death scene, even naming the disciples who were present, especially the beloved Ananda, is given in the Buddhist scriptures Abundant incidents regarding Buddha's teaching and preaching may be gathered from the same sources As to precise biography, in the strict sense of the term, there is none that is ancient, but the material may be collected from the Pali texts The introduction to the Jātākas (q v), or book of birth stories, gives an account of the previous existences of the Buddha, and a sketch of his life down to his thirty-sixth year. The two Sanskrit metrical works entitled *Buddhacarita* and *Lalita-Vistāra* (q v) contain biographical accounts, but they are not earlier than the first and the second centuries of our era, while the Pali poem *Jina Carita* (Story of the Victorious One), written in Ceylon, is as late as the twelfth

century A.D, and the *Malalankara Watthu* is of uncertain date But the continued publication of Pali texts, Tibetan writings, Chinese records, and Ceylonese accounts, is adding new information each year regarding the history of Buddha, of whose historical existence there is no longer any question, and fresh archæological discoveries and researches are contributing extensively to the knowledge already gained Consult Rhys Davids, *Buddhism* (new ed, London, 1903), and Bigandet, *Life or Legend of Gaudama, the Buddha of the Burmese* (4th ed., ib, 1911–12) See BUDDHISM

GAUTIER, gō'tyā', EMILE THÉODORE LEON (1832–97) A French paleographer and historian of literature, born at Havre He was educated at Laval and at the Collège Sainte-Barbe, Paris, entered the Ecole des Chartes in 1855, and became archivist in the national archives at Paris in 1859, and professor of paleography in the Ecole des Chartes in 1871 He was made chief secretary of the national archives in 1886 and was elected to the Institute in 1887 He was one of the greatest authorities on mediæval European literature, his works on early French literature being especially valuable He wrote *Quelques mots sur l'étude de la paléographie et de la diplomatie* (1858, 3d ed, 1864), *Scenes et nouvelles catholiques* (1861), *Benoît II* (1863), *Etudes historiques pour la defense de l'église* (1864), *Etudes littéraires pour la défense de l'eglise* (1865), *Epopées françaises* (3 vols, 1866–67, 2d ed, 1878–97), *Portraits littéraires* (1868), *La chanson de Roland* (1872), an edition which won the Guizot prize in 1878 and was repeatedly reissued, *Vingt nouveaux portraits* (1878), *La chevalerie* (1884), *Histoire de la poésie religieuse dans les cloîtres, des IXe et XIe siecles* (1887), *Portraits du XVIIIe siècle* (1888), *Etudes et tableaux historiques* (1890); *Bibliographie des chansons de geste* (1897).

GAUTIER, JUDITH (1850–1918) A French poet and historical novelist, the daughter of Théophile Gautier and the noted singer Carlotta Grisi. She was married to Catulle Mendès, but soon separated from him and married Pierre Loti, the famous novelist, in 1913, with whom she had collaborated in a play, *La fille du ciel* (1912, English, "The Daughter of Heaven"), translated and produced under their personal supervision at the Century Theatre, New York City. She is an Oriental scholar, and her works deal mainly with Chinese and Japanese themes Among them are *Le dragon impérial* (1869), *L'Usurpateur* (1875), *Les princesses d'amours* (Paris, 1900), *Le collier des jours* (ib, 1902) Consult R de Gourmont, *Promenades littéraires* (ib, 1905)

GAUTIER, (CHARLES) LUCIEN (1850–). A Swiss theologian, born at Cologny, near Geneva, and educated at Geneva, Leipzig, and Tubingen In 1877–98 he was professor of Hebrew and Old Testament exegesis at Lausanne, and thereafter honorary professor He was president of the synod of the Vaudois *église libre* in 1885, 1886, 1891, and 1892 He traveled in Palestine in 1893–94 and 1899, and wrote *Au dela du Jourdain* (1895, 2d ed, 1896), *Souvenirs de Terre-Sainte* (1898), *Autour de la Mer Morte* (1901) In addition he translated Ghazali's *Ad-Dourra el-Fâkhira* (1878) and wrote· *Le sacerdoce dans l'Ancien Testament* (1874), *La mission du prophete Ezéchiel* (1891), *Vocations de prophètes* (1901, in German, 1903), *Introduction a l'Ancien Testament* (1906), *La loi dans l'ancienne Alliance* (1908), *L'Evangeliste de l'exil* (1911)

GAUTIER, MARGUERITE The name of an idealized courtesan, who is the heroine of *La dame aux camélias*, by the younger Dumas By a quaint translation of sound rather than sense the name has been changed to "Camille" in the English adaptation

GAUTIER, THÉOPHILE (1811–72) A noted French poet, critic, and novelist Born at Tarbes, Aug 31, 1811, he went as a child to Paris and was educated there He showed special interest in the Latin of the Decadence and the French of the Renaissance, being attracted less by the normal than by the primitive or the overrefined He became a painter, then a "flamboyant" Romanticist, joining as a leader in the "Battle of Hernani" (see HUGO), defying conventionality by his flowing hair and far-famed scarlet waistcoat His poems of this period, *Premières poésies* (1830) and *Albertus* (1832), show a highly developed technique and a minute power of description Then followed *Les Jeunes-France* (1832), stories of nonchalant irony, mocking alike romantic liberty and classic restraint Gautier's next book, *Mademoiselle de Maupin* (1835), a curious attempt at self-analysis, was a frank expression of hedonism Its art is fascinating, but it treats the fundamental postulates of morality with a contempt that closed the Academy to him for life *Fortunio* (1837) is also frankly pagan In 1836 Gautier put on the harness of journalistic criticism, embracing art and the drama, and his later works were, perforce, less offensive to the moralists The best of the short stories printed in 1845, *La morte amoureuse*, bears the date of 1836 The deadening effect of this hack work wore off in the fifties He produced during this decade the masterful short stories, *Arria Marcella*, *Jettatura*, and *Avatar*, and the curiously antiquarian *Roman de la momie* But none of these approaches in interest *Le capitaine Fracasse*, which had been announced in 1836 and appeared in 1861 and 1863 (2 vols), as "a bill drawn in my youth and redeemed in middle life" It is a true classic of romanticism, illustrating a minute knowledge of the epoch of Louis XIII such as Gautier had already been showing in a series of literary studies, *Les grotesques* (1844)

In literary criticism Gautier's most significant works are his *Histoire du romantisme* (1854), his essays on Baudelaire and Lamartine, and his *Rapport sur le progrès de la poésie depuis 1830* (1868) An important event in his life was his change from the staff of *La Presse* (1836–54) to the *Moniteur* (later the official journal of the Second Empire) Until his death he was a critic of authority in Paris and exceptional for the charm of his paragraphs These articles were assembled in *Histoire de l'art dramatique en France* (6 vols, Paris, 1858–59) In these he inveighed against the classic and the bourgeois drama Gautier was a great traveler for his time and described his journeys in many books—*Voyage en Espagne* (1843), *Italia* (1852), *Constantinople* (1854), *La Russie* (1866), etc, some of which are still widely read, owing to his graceful, limpid language, and his fondness for discovering artistic effects

His particular claim to fame, however, lies in his unique gifts as a poet as represented by his masterpiece, *Emaux et camées*—a rather small

collection of poems written between about 1850 and 1865 They are nearly all in geometrical stanzas of four lines and eight feet and are distinguished for their impeccable daintiness, exhibiting Gautier's love of miniature effects and his adoration for the sculptural and for the color white This volume shows how concretely Gautier, a former leader of the Romantic school, helped to shape the ideals of the Parnassian school, which was to abandon the exaggerated ego of the Romanticists for the more polished and impersonal technique of the Classicists In this connection it may be said that he was the originator of the art for art's sake theory in France and the prime inspiration of Beaudelaire In its pages there is no flesh and blood, life appears merely as plastic form and picturesque hue The *Poésies* may be thought of perhaps as a French pendant to the little poems of Heine and quite as exquisite in their way Likely the most famous of them, and certainly as characteristic as any, is the one entitled *Symphonie en blanc majeur* It celebrates the author's worship of the white, cold divinity of the passionless nude, which forever torments him with its mute, sphinxlike messages of inert beauty

Gautier was a great genius in his own narrow limits, rather unmindful than void of ideas and sentiments, uniting in his pages the pictorial exotic with the pagan plastic, in accordance with his celebrated saying "I am one for whom the visible world exists" In treating his soulless images he employed with the accuracy of a true artist a vocabulary famed for its rich resources and a style remarkable for its faultlessness For 40 years he was one of the interesting and conspicuous figures of the Paris literary and art world A somewhat grotesque personality, he wore by preference the mask of a grave stoic in a sort of relaxed hopeless attitude towards his impecunious destiny When he spoke, it was to give utterance to some memorable remark or resigned witticism, or to indulge in a droll monologue composed of the sublime and the absurd He was a cosmopolitan, remarkably open for a Frenchman to foreign influences He died in Paris, Oct 23, 1872

Consult the *Works* of Gautier as edited in English by Sumichrast (24 vols, Boston, 1900 et seq), the monographs by Baudelaire (Paris, 1859), Feydeau (ib, 1874), Bergerat (ib, 1878), Du Camp (ib, 1890), also Sainte-Beuve, *Nouveaux lundis* (ib, 1863–72), Spoelberch de Lovenjoul, Brunetière, *Evolution de la poésie lyrique* (ib, 1894), Faguet, *XIXe siècle* (ib, 1894), Deschamps, *La vie et les livres* (ib, 1900), J G Huneker, *The Pathos of Distance* (New York, 1913), E Henriot, "Théophile Gauthier, poète," in *Annales Romantiques* (1912)

GAUTIER DE COSTES, gō'tyā' de kōst. See LA CALPRENÈDE

GAUTING, gou'tĭng, EREMIT VON See HALLBERG-BROICH, THEODOR M. H

GAUTSCH VON FRANKENTHURN, gouch fŏn frank'en-tōōrn, PAUL, BARON VON (1851–) An Austrian statesman, born and educated in Vienna. In 1874 he entered the Department of Education and in 1885–93 was Minister of Education in the Taafe cabinet Minister of Education again under Badeni (1895–97), he succeeded Badeni and was Minister of the Interior and head of the cabinet for three months in 1897–98 and then became President of the Supreme Court of Accounts On Dec 31, 1904, he succeeded Koerber as Premier, but, on the failure of his scheme for the establishment of universal suffrage, resigned in May, 1906 In 1911, from June 26 to October 31, he was again Premier

GAUZE (Fr *gaze*, ML *gazzatum*, probably of Eastern origin, cf Pers *gazī*, thin, coarse cotton cloth, less probably from the Syrian city of *Gaza*) A light transparent fabric, originally made of silk The openness of texture is obtained by crossing the warp threads between the threads of the weft, so that the weft passes through a succession of loops in the warp, and the threads are thus kept apart, without the liability to sliding from their places, which would take place if simple weaving were left so loose and open Large quantities of medicated and antiseptic cotton gauze are used by surgeons *Bolting cloth* is a gauze made of unsized silk for separating the products of a flour mill (See FLOUR) Fine wire cloth is called *wire gauze* The term is also applied to light woven fabrics of silk, linen, or cotton, such as are used in the manufacture of summer underwear

GAVAGE, ga'vazh' (Fr, from *gaver*, to gorge) A method of feeding infants, and sometimes adults, when, by reason of weakness or disinclination, the individual is unable to take food in the ordinary way. It is of great value in rearing premature infants and in those so weak that they are unable to suck or swallow, and among adults in certain types of insanity The apparatus consists of a soft rubber catheter, connected by a short glass tube, and about 18 inches of rubber tubing, to a glass funnel, which holds from 4 to 6 ounces The catheter is introduced either through the nostril or the mouth, passed through the œsophagus and into the stomach, and, after waiting a few moments to allow the gas to escape, the food is simply poured into the funnel When the latter is emptied, the tube is compressed between the fingers and quickly withdrawn

GAVARNI, ga'var'nē' (1804–66) A noted French caricaturist and illustrator of great originality and verve, an historical satirist of inexhaustible inventive power who portrayed types of French character, and in particular the various phases of Parisian life His real name was Guillaume Sulpice Chevallier, and he was born in Paris, Jan 13, 1804 When a mere boy, he was placed with an architect, then at the age of 13 was apprenticed to a maker of mathematical instruments, and two or three years later studied mechanical drawing at the Conservatoire des Arts et Métiers This was all the artistic training he ever received In 1824 he took up etching in the employ of Jean Adam, who sent him to draw and engrave the bridge at Bordeaux, for which he was to receive 1200 francs a year, but, finding the employment uncongenial, he threw it up before the year was out and wandered about for some months, apparently without aim By a lucky chance he found a benefactor at Tarbes in M Leleu, the superintendent of the cadastre in the Pyrenees, who gave him employment and made him at home in his family, until an offer of regular work took him back to Paris in 1828 Here he taught himself to draw the human form, and gradually acquired the mastery of technique which so preeminently distinguished him In 1829 he adopted his nom de guerre, derived from

the beautiful valley of Gavarnie in the Pyrenees In 1830 he made the acquaintance of Emile de Girardin, who invited him to make the designs of costumes for *La Mode*, and it was in its office that he met Balzac, who shortly after asked him to illustrate his *Peau de chagrin* Other papers also had the aid of his pen and pencil, and theatrical tailors and costumers found in him a valuable assistant, but his greatest success was as a satirist of the dandyism of the day With the year 1832 the period of uncertainty came to an end, and from that date he could count upon an appreciative and faithful public Two years later he founded the *Journal des Gens du Monde*, of which he was at once editor and illustrator, and to which he contributed verse and prose, illustrating both with charming drawings The undertaking proved unprofitable, and after struggling through six months of existence landed its parent in the debtor's prison at Clichy While, restored to liberty, he was hesitating as to his future course, he received a liberal offer from the proprietor of the *Charivari* Modifying the publisher's idea, the artist produced the series of drawings known as *Les fourberies de femmes en matière de sentiment* (The Tricks of Women in Matters of Sentiment), which was soon followed by *La boîte aux lettres* (The Letter Box) Illustrating the Bohemian world in which he lived, series after series flowed from his pencil, all instinct with vivacity and force, and drawn mostly from the shady side of Paris life, like *Les lorettes* (The Ladies of Easy Virtue), *Les coulisses* (Behind the Scenes), *Le carnaval*, *Les étudiants* (The Students), *Les débardeurs*, etc, while later he embodied in other series his studies in superior strata of society, as in the well-known *Les enfants terribles*, and in *La politique des femmes* (Female Politics), *Impressions de ménage* (Household Impressions), *Nuances et sentiments*, and others

In 1844 he married Jeanne de Bonabry, but the union did not prove happy, and three years later he went to London He returned in 1852, so deeply impressed by the scenes of degradation and wretchedness he had witnessed that it seemed to color all his future work, and it is said that he never laughed again nor made others laugh He continued the practice of his art, but his tone was sterner, and his satire became more biting Some of the series of this last period exhibit his tendency to be a moralist, as may be noticed in *Les partageuses* (The Partners), *Les lorettes vieilles* (Ladies of Easy Virtue Grown Old), and *Les propos de Thomas Virelogue* (The Sayings of Thomas Virelogue) Among his best illustrations for books are those of Eugene Sue's *Wandering Jew*, Hitzel's *Le diable à Paris*, Balzac's *Paris marié*, and *Gulliver's Travels* Gavarni had great literary ability and was a brilliant water-color painter, fine examples of his work in this medium are in the Louvre and many private collections He also essayed painting in oils, but without much success During his last years he inclined more and more towards scientific pursuits and passed most of his time in his garden at Auteuil with his two boys He died there, Nov 24, 1866

The *Catalogue raisonné de l'œuvre de Gavarni*, issued by Mahérault and Bocher (Paris, 1873), conveys an adequate idea of the extraordinary amount of work performed by this unique prince of the pencil In the Bibliothèque Nationale, Paris, his drawings fill 15 folio volumes, but they represent little more than half of his work, which numbers about 8000 drawings, water colors, and lithographs For his biography, consult Duplessis (Paris, 1876), Goncourt (ib, 1879), and Forgues in *Les artistes célèbres* (ib, 1888), also Mirecourt, *Les contemporains* (ib, 1856), Blanc, *Les artistes de mon temps* (ib, 1876), Beraldi, *Les graveurs du XIXème siècle* (ib, 1885–92), Curtis, *Masters of Lithography* (New York, 1897), and the biographical notes on Daumier and Gavarni by Frantz and Uzanne, published as a separate volume of the *Studio* (1904)

GAVARNIE, ga'var'nē' A frontier village in the Department of Hautes-Pyrénées, France, on the Gave-de-Pau, 34 miles south of Tarbes The village originated in a hospital of Knights Templars, and is famous for the Cirque de Gavarnie, 3 miles to the south, a natural amphitheatre, nearly 9 miles in circumference, surrounded by three ranges of limestone mountains, rising respectively to an altitude of 6900, 8500, and 9000 feet, the intermediate slopes being covered with glaciers Thirteen cascades fall into the Cirque, the principal one, the Cascade de Gavarnie, fed by the Gave-de-Pau, having a drop of 1385 feet Pop, 1901, 269, 1911, 298

GAVAZZI, ga-vat'sē, ALESSANDRO (1809–89). A popular Italian preacher and reformer He was born at Bologna, became a monk of the Barnabite Order in 1825, and in 1829 professor of rhetoric at Naples He entered the priesthood and acquired great reputation as an orator and advocate of liberal ideas In 1840 he was transferred to Rome He was one of the foremost supporters of the liberal policy that marked the beginning of the pontificate of Pius IX and was prominent in the patriotic movements of the time When Rome was captured by the French (July, 1849), he escaped to England and lectured in that country and in Scotland He also visited the United States and Canada, where his reception was not always favorable In 1850 he renounced Catholicism and became pastor of an Italian church in London In 1860, having returned to Italy, he accompanied Garibaldi in the campaign of that year After the battle of Mentana (1867) he devoted himself entirely to the Free church of Italy, which he organized in 1870 He established a theological school of the church at Rome in 1875 and became its professor of dogmatics, apologetics, and polemics He made his last visit to America in 1881 He died in 1889 He published *Orations* (London, 1851), *Recollections of the Last Four Popes* (ib, 1859), *Records of Two Years' Christian Work in Italy* (ib, 1868) For his life, consult King (ib, 1860), and *Lectures in New York*, with life by Campanella and Nicolini, corrected by himself (New York, 1853)

GAVELKIND, gāv'el-kīnd (Ir *gabhail-cine*, from *gabhail*, tenure + *cine*, family) An ancient form of tenure in England, which antedated the Conquest, and which, in the County of Kent and in some parts of Northumberland and Wales, survived the coming and the disappearance of the feudal system Its principal characteristic was the fact that the lands so held passed by descent to all of the sons of the tenant equally, instead of going, under the feudal rule of primogeniture, to the eldest son alone Though Blackstone, probably with reason, ascribes a Celtic origin to this tenure, it seems to be the general opinion of English legal writers that it prevailed over the whole kingdom

in Anglo-Saxon times, and that in Kent and elsewhere it was among the "liberties" which the people were permitted to retain at the Conquest In Wales gavelkind obtained universally till the time of Henry VIII (34 and 35 Hen VIII, c 26), and in some parts of England it is not yet abolished In Kent all lands that have not been disgaveled by act of Parliament are held to be gavelkind In addition to the characteristics of this tenure already noticed, Blackstone mentions the following 1 The tenant is of age sufficient to alien his estate by feoffment at the age of 15 2 The estate does not escheat in case of an attainder for felony, their maxim being, "the father to the bough, the son to the plow" 3 In most places the tenant had a power of devising lands by will before the statute authorizing the devise of lands generally was made See TENURE, and consult Blackstone, *Commentaries* (Chicago, 1899), and the authorities cited under TENURE

GAVERE, gȧ'vr'. A small town in the Province of East Flanders, Belgium, near Ghent Pop, 1900, 1893, 1910, 1942 In 1453 it was the scene of a crushing defeat of the citizens of Ghent by Philip the Good, Duke of Burgundy

GAVERNITZ, G VON SCHULZE See SCHULZE-GAVERNITZ.

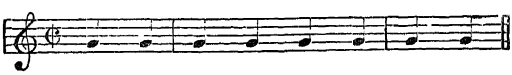
GAV'ESTON, PIERS, EARL OF CORNWALL (?–1312) The favorite of Edward II, King of England His father was a Gascon knight attached to the royal household of Edward I Here, from an early age, Piers was a companion of the heir apparent, who, on his accession to the crown, created him Earl of Cornwall He was witty and clever, but unscrupulous in the pursuit of his ambitious designs Presuming on the King's regard for him, his attitude towards the English barons was of such a nature as to excite their enmity His nomination as Regent of the kingdom during the royal absence in France in the early months of 1308, and the honors conferred upon him at the coronation in the same year, aroused the open hostility of the barons, in compliance with whose demands the King was forced to send Gaveston out of the kingdom, making him, however, Lord Lieutenant of Ireland In July, 1309, he was recalled and, firm in the King's favor, grew more insolent than ever This led Parliament to insist upon his banishment in October, 1311. In less than two months, however, he returned and was reinstated in royal favor, whereupon the barons rose in arms, besieged Gaveston in Scarborough Castle, captured him, and beheaded him on Blacklow Hill, near Warwick, on June 10, 1312 In Marlowe's *Tragedy of Edward II* Gaveston plays a prominent part Consult Stubbs, *Constitutional History*, vol ii (Oxford, 1896), and Dodge, *Piers Gaveston* (London, 1899)

GA'VIAL, or **GHARIAL** (from Hind *gharyāl*, fish eater) A fish-eating crocodile of northern India (*Gavialis gangeticus*), differing from true crocodiles and from alligators in the great length and slenderness of the muzzle, and the cartilaginous swelling at its extremity (in old males) around the orifice of the nostrils by which it may be largely inflated The teeth are very numerous, about 120; the longest of the lower jaw are received into notches in the upper, as in the true crocodiles The head is broad, the narrow muzzle begins abruptly, and in it the branches of the bone of the lower jaw are united and prolonged as one There are two great perforations in the bones of the skull behind the eyes, externally marked by depressions The plates which cover the back and the nape of the neck are united The crest of the tail is much elevated, the feet are webbed to the extremity of the toes Its habits are as aquatic as those of the crocodile of the Nile It attains a great size, but, owing to the slenderness of its muzzle, is esteemed less dangerous than a true crocodile of smaller size The genus dates from the Upper Chalk period See CROCODILE

GAVINIÉS, gȧ'vē'nyā', PIERRE (1726–1800) A French violinist and composer He was born at Bordeaux and was practically a self-taught musician When only 15, he made his début at a "concert spirituel," an enterprise which he in part projected His success was immediate, Viotti, hearing him play, remarked that he was *le Tartini de la France* From 1795 until his death he was professor of the violin at the Paris Conservatory His style is said to have been formed upon that of the old Italian masters and was remarkable for its expressive and sympathetic qualities He was of greatest importance in the development of violin technique in France, where he is considered the founder of the modern school of violin playing His compositions for the violin are for the most part very difficult and comprise *Les vingt-quatre matinées*, six violin concertos, and nine violin sonatas He also composed a three-act comic opera, *Le prétendu* (1760), which met with considerable success He died at Paris

GAV'IO'TA (Neo-Lat, from Lat *gavia*, sort of bird, probably a sea mew) A species of gull (*Larus cirrocephalus*), very familiar about the harbor of Buenos Aires and neighboring parts of South America Consult *Proceedings of the Zoological Society of London* (London, 1871).

GAVOTTE, gȧ-vŏt' A French dance, whose name is derived from the *Gavots*, a people inhabiting the Pays-de-Gap, in Dauphiné Originally a peasant dance, it was introduced at court in the sixteenth century and was largely remodeled in the seventeenth and eighteenth centuries Its distinctive feature consisted of the performers raising their feet clear of the ground, instead of shuffling along, as was usual in dances of this character Kissing and merry-making played a great part in the old gavotte, but subsequently it became almost as stiff and formal as the minuet. As a theatrical dance, the gavotte was effective and popular, Gluck and Grétry in particular having written famous ones The music is in alla-breve time; in two parts—the first of four, the second of eight bars —and each part is repeated As each phrase begins with an up beat, the fundamental rhythm of the gavotte is



by which the second bar has a remarkable cæsura Some of Bach's suites contain excellent examples of the gavotte It generally commences on the third beat of the bar, though this rule is not without its exceptions. See SUITE

GAVRE, PRINCE OF See EGMONT, LAMORAL

GAVROCHE, gȧ'vrŏsh' A street urchin in Victor Hugo's *Les Misérables*

GAWAIN, gȧ'wȧn, SIR One of the knights of the Round Table. He is the nephew of King Arthur (q v) and his ally in the war

with Launcelot He tries in vain to pull the magic sword from the magic stone, fails in the quest of the Holy Grail (q v), and dies from wounds received in a fight with Launcelot Consult *Sir Gawain and the Green Knight* (New York, 1910), retold in modern prose, with introduction and notes, by J L Weston, *Gawayne and the Green Knight* (New Haven, 1913), ed by C M Lewis, Malory, *Morte d'Arthur*, Tennyson, *Idylls of the King* The name is also given to a knight in *Amadis of Gaul*

GAY, gā, CLAUDE (1800–73). A French traveler and naturalist, born at Draguignan, France He pursued scientific studies primarily in Paris and, after a few months' travel in Greece and Asia Minor, sailed, in 1828, to Chile with the intention of making an extensive study of the flora of the South American continent With the exception of a short period in 1832–33, which he spent in Paris supervising the construction of some scientific instruments of his own invention, Gay remained in South America until 1843, making extensive researches in Chile and parts of Peru and collecting a great mass of material, not only in regard to the flora of the country, but its physical characteristics and political history as well In 1843 he returned to Paris, where, by means of financial aid furnished by the Chilean government, he was enabled to publish (in Spanish) his monumental *Historia física y política de Chile* (24 vols, 1843–51, with an atlas in 2 vols) Gay spent 1856–58 in travel in Russia and the Orient and in 1858 was commissioned by the Academy of Sciences, of which he had been elected a member, to study mining in the United States, the results of his investigations being incorporated in an interesting work entitled *Rapport à l'Académie des Sciences sur les mines des Etats-Unis* (1861) Among his other publications were *Consideraciones sobre las minas de mercurio de Andacolla é Illapel con su posición geológica* (1837), *Origine de la pomme de terre* (1851), *Triple variation de l'aiguille aimantée dans les parties ouest de l'Amérique* (1854), *Carte générale du Chile* (1855)

GAY, DELPHINE, MADAME DE GIRARDIN (1804–55) A French novelist and miscellaneous writer, nicknamed the *Muse de la Patrie* She was born at Aix-la-Chapelle, the daughter of Sophie Gay (q v), and in 1831 became the wife of Emile de Girardin (q v) Her great beauty and charming wit made her salon the most brilliant of her period While she collaborated with such great authors as Sandeau and Théophile Gautier and contributed rather cleverly to the *Lettres parisiennes* (1836–48) under the pseudonym of De Launay, she can hardly be ranked as a great literary light Of her numerous but ephemeral productions a comedy, *La joie fait peur*, and a novel, *Le lorgnon* (1831), are sufficiently typical Consult Imbert de Saint-Amand, *Madame de Girardin* (Paris, 1875, 1888), F de Baudiss, *Choix de lettres parisiennes* (London, 1906), L. Séche, *Les Muses romantiques* (Paris, 1910), Jean Balde, *Mme de Girardin* (ib, 1913)

GAY, EDWARD (1837–) An American landscape painter. He was born in Dublin, Ireland, but came to America in 1848 and studied at Albany, N Y, and in Karlsruhe, Germany, under Schirmer and Lessing His landscape "Broad Acres" received a prize of $2000 from the American Art Association and was given by it to the Metropolitan Museum of Art in 1887 His mural painting "Taormina" is in the Mount Vernon (N Y) Public Library Among other noteworthy paintings are "Washed by the Sea" (Layton Museum, Milwaukee), "Waving Grain" (Minneapolis Gallery), "The Hill Side" (National Gallery, Washington), "The Month of May" (Chicago Art Institute), "Pines of South Carolina" (1904), "The House on the Moor" (1912), "Low Tide" (1913) Gay received the Shaw prize in 1903, the Inness gold medal in 1905, and was elected a member of the National Academy of Design in 1907 With a simple and unaffected art he paints by preference the large sunny aspects of nature, distinguished for fine atmospheric effects

GAY, JOHN (1685–1732) An English poet and dramatist, born in 1685 at Barnstable Devonshire, of an ancient but impoverished family After attending the free grammar school he was apprenticed to a London mercer, but, dissatisfied with the occupation, he soon abandoned it In 1712 he was appointed secretary to the Duchess of Monmouth He had already written "Wine" (1708), a poem in blank verse, and a pamphlet entitled *The Present State of Wit* (1711), which gives an account of the current periodical literature In 1713 he published a poem descriptive of country life, called "Rural Sports" It was dedicated to Pope, whose acquaintance Gay had made two years before Now under Pope's influence, he produced *The Fan* (1714) and *The Shepherd's Week* (1714), a series of pastorals aimed against Ambrose Philips Appointed secretary to Lord Clarendon, Envoy to Hanover, he was abroad in the summer of 1714 Returning to England in September, he addressed an epistle to the newly arrived Princess of Wales (October) His next production was a farce in ridicule of popular tragedies, entitled *What-d'-ye-Call-It* (1715) It contains the famous song, "'Twas when the seas were roaring" Next came *Trivia* (1716), descriptive of outdoor life in London This was followed by an unsuccessful comedy, *Three Hours after Marriage* (1717) Three years later he published a collection of his poems with additions, by which he cleared £1000 Here first appeared his finest ballad, "Sweet William's Farewell to Black-Ey'd Susan" His poems appeared in 1720, and in the same year, entering into the South Sea speculations, he lost everything and became dependent on his friends, the kindest of whom were the Duke and Duchess of Queensberry In 1724 he produced for Drury Lane Theatre the tragedy of *The Captives*, which met with some success Three years later came the popular verse tales entitled *Fables*, the best of their kind in English Gay was yet to gain his great fame His Newgate pastoral, *The Beggar's Opera*, was first performed at Lincoln's Inn Fields, Jan 29, 1728 It ran for 63 days, was revived the next season, and performed in all the great English towns Gay wrote a sequel entitled *Polly*, which was prohibited, but it succeeded remarkably in book form A fully illustrated edition of *The Beggar's Opera*, containing also *Polly Peachum*, appeared in New York, 1913 Gay died Dec 4, 1732 A second series of *Fables* appeared posthumously (1738) The *Fables*, with memoir, were edited by Dobson (London, 1882), and the *Poetical Works* by Underhill (ib, 1893) Consult Johnson, *Lives of the Poets* (ib, 1854), and Thackeray, *English Humorists* (ib, 1853).

GAY, Maria (c 1880–) A Spanish dramatic mezzo-soprano, born at Barcelona Originally she studied sculpture, which art she pursued eagerly until her sixteenth year Then she began to study the piano and soon showed that she possessed remarkable talent When Pugno (q v) on one of his tours through Spain heard her sing, he was so struck with the natural beauty and power of her voice, which at that time had not yet been cultivated, that he immediately engaged her for some of his own concerts At Brussels the director of the Opera heard her in a concert with Ysaye and asked her to study the rôle of Carmen Incredible as it may sound, five days later she not only made her début in that difficult rôle at the famous De la Monnaie (1902), but also through the sheer force of her natural gifts scored a veritable triumph This very success convinced her of the necessity of serious study, and she at once went to Paris, where she worked indefatigably for one year with Madame Adiny In 1903 she reappeared as a finished artist and began her triumphant tours of Europe and South America During the season of 1908–09 she sang at the Metropolitan Opera House in New York

GAY, gā, Sophie Nichault de Lavelette (1776–1852) A French novelist, born in Paris, July 1, 1776 Her novel *Laure d'Estell* (1802) has a sort of biographical interest, for it was written to indicate how much the author liked Madame de Stael and disliked Madame de Genlis Although a prolific writer, she is better known as the mother of the famous Delphine Gay and for her literary salon, most celebrated during the reign of Louis Philippe

GAY, Sydney Howard (1814–88) An American journalist and historian He was born in Hingham, Mass , studied for a time at Harvard, then traveled, worked in a counting house in Boston, and afterward studied law, but became an Abolitionist, and was precluded from practicing by his refusal to take the oath to support the Constitution He became a lecturing agent for the American Anti-Slavery Society in 1842, and the editor of the *National Anti-Slavery Standard*, the official organ of the society, in 1844 He accepted a position as an editorial writer on the New York *Tribune* in 1857 and from 1862 to 1866 was its managing editor Subsequently he was managing editor of the Chicago *Tribune* from 1868 to 1871 and an editorial writer on the New York *Evening Post* from 1872 to 1874. Though nominally only a collaborator, he actually wrote nearly the whole of Bryant and Gay's *Popular History of the United States* (1876–80), a work whose comprehensiveness, clearness, and accuracy soon gave it a high rank among compendiums of American history He also wrote a *Life of Madison* (1884) for the "American Statesmen's Series", the chapter on Amerigo Vespucci in Winsor, *Narrative and Critical History of America* (1886–89), and many articles on historical subjects for the magazines

GAY, Walter (1856–) An American interior painter He was born at Hingham, Mass, and went in 1876 to Paris, where he studied under Bonnat He first became known for his clever and frankly truthful genre pictures, such as the celebrated "Bénédicité" "The Blessing" (1888), now in the Amiens Gallery, "The Cigarette Makers," in the Luxembourg (Paris), and "The Spinners," in the Metropolitan Museum, New York—all of which are characterized by skillful handling of light and harmony of tone In his later work he devoted himself to rich interiors without figures, painted with great delicacy, charm, and precision, but never cold or overfinished Good examples are "Gold and White," "The Medallions," and "Interior," in the Luxembourg, "Interior of the Palazzo Barbaro" (Boston Museum), "Interior of the Petit Trianon" (School of Design, Providence), and "Green Salon" (Metropolitan Museum, New York) He is also represented in the museums of Pittsburgh, Chicago, Philadelphia, Brussels, Munich, and in the Tate Gallery, London He made Paris his residence, exhibited constantly at the Salon after 1879, and sold more pictures in France than any other stranger He became a chevalier of the Legion of Honor in 1894, and officer in 1906, and received gold medals at Vienna (1894), Berlin (1896), Munich (1897), and Paris

GAY, Winckworth Allan (1821–1910) An American landscape painter, born at West Hingham, Mass He studied under Robert Weir at West Point and Troyon in Paris, and traveled extensively in Europe and the Orient He was one of the first to break away from the dry, thin manner of the early American landscape school, and his paintings, which are simple and sincere, have not been properly appreciated outside of Boston, where his art life in America centred, and where most of his work is preserved He painted American, French, Dutch, Italian, Egyptian, and Japanese scenes, among the best being "Mackerel Fleet off Beverly Coast," "Harbor Day at Cape Ann," "Windmills of Delfthaven, Holland," "Forest Sanctuary," "Nimich on the Nile," "Scene in the White Mountains" (Boston Athenæum), "Scene in Japan" (Somerset Club, Boston)

GAYA, gī'a, or **GYA** The capital of the district of Gaya, in the Presidency of Bengal British India, on the Phalgu, an affluent of the Ganges, 57 miles south of Patna by rail (Map India, E 4) A place of great sanctity, it is annually visited by thousands of pilgrims It consists of the old town, Gaya proper, and Sahibganj, the modern European and trading quarter Of its many shrines and temples the most important is the temple of Vishnu, crowned by an octagonal pyramid over 100 feet high Its public institutions include a well-attended high school and a hospital with a branch for women Pop, 1901, 71,288, 1911, 49,921 The manufactures of the town, largely carried on by prison labor, include oil, metal work, woven ware, bamboo baskets, cotton rope, mats, and jute twine Buddha Gaya, 7 miles to the south, the ancient dwelling place of Gautama Buddha, is the seat of a famous temple, which dates from 543 B C and has a pipal tree, the descendant of the one under which the saint attained Nirvana. Population of district, 2,225,000

GAYAL, gā'al, *Hind* ga-yal' (probably from Skt *gaya*, household), or Mithan A species of native cattle (*Bos frontalis*), closely related to the gaur, which has long been more or less domesticated among the hill tribes of northeastern India, and thence eastward through Assam to the Chinese borders, where it is known as *mithan* It was formerly considered a race of the gaur (q v), but is now known to be a distinct species, which Blanford asserts to exist wild in Tenasserim It resembles the gaur, but is of less size, has proportionately shorter limbs,

less of a ridge on the back, and the horns shorter and less compressed at the base The head is very broad and flat at the upper part, suddenly contracted towards the nose, with a very wide space between the horns The prevailing color is brown, generally dark, but in some of the herds particolored and white ones are frequently seen The Keskis, of Tipperah, and other eastern hill tribes keep herds of gayals, which they permit to roam at large during the day in the forests, but which return home at night of their own accord Their milk is extremely rich, but not abundant, the natives, however, do not use the milk, but rear these cattle entirely for their flesh and skins They are never used in agricultural labor nor as beasts of burden and, though occasionally interbred with captive gaurs, have given rise to no domestic race Beyond the fact that it is, like the gaur, an inhabitant of the forests, and is surprisingly agile among rocky hills, nothing is known of the habits of the gayal in a wild state See Plate of CATTLE, WILD

GAYANGOS Y ARCE, gī-aṇ′gōs ē är′thā, PASCUAL DE (1809–97) A Spanish historian He studied at Madrid and later in France, held office under the Spanish government (1833–36), then lived for a time in London, where he translated into English Al Makkari's *History of the Mohammedan Dynasties* (1840–43) He became professor of Arabic at the University of Madrid and in 1881 Director of Public Instruction Resigning soon afterward, he spent much of his time in London The historian Prescott, in his preface to *Ferdinand and Isabella*, acknowledges the valuable services of Señor de Gayangos, and he repeats these acknowledgments in his *Philip II* He refers particularly to the remarkable facility of Gayangos "in deciphering the mysterious handwriting of the sixteenth century," with which "he combined such a thorough acquaintance with the history of his country as enabled him to detect, amid the ocean of manuscripts which he inspected, such portions as were essential to my purpose" His works, as editor, include a Spanish edition of Ticknor, *History of Spanish Literature* (1851–56), *Cartas y Relaciones de Hernán Cortés al Emperador Carlos V* (1866), *Fifth Letter of Hernan Cortes* (1868), *Calendar of Letters, Despatches, and State Papers England and Spain, 1525–1529*, vol. iii (1873–77), two volumes in the *Biblioteca de Autores Españoles*—vol xl, *Libros de Caballerías* (1874), and vol li, *Escritores en prosa anteriores al siglo XV* (1884) His best original work is his *Discurso preliminar* to the edition of the *Libros de Caballerias* He also prepared a *Catalogue of Manuscripts in the Spanish Language in the British Museum* (1875)

GAYARRÉ, gā′ar-rā′, CHARLES ETIENNE ARTHUR (1805–95) An American historian He was born at New Orleans, La, Jan 9, 1805, was educated in the College of New Orleans, studied law in Philadelphia, and was admitted to the bar in 1829 Returning to New Orleans, he was soon made a member of the Legislature, Deputy Attorney-General of the State, and presiding judge of the New Orleans City Court. In 1835 he was chosen United States Senator, but on account of ill health did not serve and spent the next eight years in Europe After his return he was twice again elected to the Legislature and was for seven years (1846–53) Secretary of State for Louisiana, doing much for the State library and for local historical studies He was in favor of secession and advocated the emancipation and arming of the slaves But although a prominent figure of the public life of Louisiana, his main bent was literary, and in the course of his long life he published many volumes, including some romances and dramas He is best known, however, as the historian of his State He died in New Orleans, Feb 11, 1895 Among his books we may cite *Histoire de la Louisiane* (1847), *Romance of the History of Louisiana* (1848), *Louisiana Its Colonial History and Romance* (1848–52), *Louisiana, Its History as a French Colony* (1851), *History of the Spanish Domination in Louisiana* (1854), *Philip II of Spain* (1866) The complete *History of Louisiana* appeared, in 1866, in four volumes His romance *Fernando de Lemos* gives an interesting picture of old New Orleans

GAYER, gī′ĕr, JOHANN KARL (1822–1907) A German forester, born at Speier In 1855 he was appointed professor of forestry at Aschaffenburg, whence he was in 1878 called in the same capacity to the University of Munich In his work entitled *Der Waldbau* (2 vols, 1878–80, 3d ed, 1889, 4th ed, 1898), he introduced a new method of instruction in forestry, based upon a stricter adherence to natural laws His manual of forestry, entitled *Die Forstbenutzung* (1863, 10th ed, 1909), is the authority on that subject in Germany Other works by the same author are *Wald im Wechsel der Zeiten* (1889) and *Der Femelschlagbetrieb in Bayern* (1895)

GAY HEAD See MARTHA'S VINEYARD

GAY'LEY, CHARLES MILLS (1858–) An American author He was born at Shanghai, China, where his parents were missionaries, and was educated in England, at the University of Michigan (1878), and at Giessen and Halle, Germany At the University of Michigan he taught Latin from 1880 to 1887 and English in 1887–89 and then became professor of English in the University of California His publications, the more important of which deal with the history and criticism of the English drama, include *Classic Myths in English Literature* (1893), *A Guide to the Literature of Æsthetics*, with F N Scott (1890), *Methods and Materials of Literary Criticism*, with F N Scott (1899), *Representative English Comedies* (5 vols, vol i, 1903, vol ii, 1913), a valuable collection of texts and notes by various scholars, *The Star of Bethlehem* (1904), *Songs of California* (ed) (1905), *Plays of our Forefathers* (1907), *Idols of Education* (1910), *English Poetry Its Principles and Progress*, with C C Young (1911), *Beaumont the Dramatist* (1914)

GAYLEY, JAMES (1855–1920). An American inventor and corporation official, born at Lock Haven, Pa He graduated as a mining engineer from Lafayette College in 1876 Between 1877 and 1885 he was chemist successively of the Crane Iron Works at Catasauqua, Pa, the Missouri Furnace Company at St Louis, Mo, and the E & G Brooke Iron Company at Birdsboro, Pa He then served as superintendent of the blast furnaces, and later as manager, of the Edgar Thompson Steel Works, and finally as managing director of the Carnegie Steel Company From 1901 to 1909 he was first vice president of the United States Steel Corporation, and as such had full charge of the shipping and transportation Gayley in-

vented a bronze cooling plate for the walls of blast furnaces, and an auxiliary casting stand for Bessemer steel plants, and he was the first to use the compound condensing blowing engines with the blast furnace For inventing the dry-air blast (see IRON AND STEEL), he received the Elliott Cresson medal of the Franklin Institute of Philadelphia In 1904–05 he was president of the American Institute of Mining Engineers and from 1905 to 1911 president of the board of directors

GAY-LUSSAC, gā'lu'sāk', JOSEPH LOUIS (1778–1850) One of the most distinguished chemists and physicists of the nineteenth century He was born at Saint-Leonard le Noblat (Haute-Vienne) In 1794 he was sent to Paris and was admitted to the Ecole Polytechnique in 1797 After three years' study Berthollet, who was then professor of chemistry in the Ecole Polytechnique, selected him as his assistant at Arcueil, where the government chemical works were situated In 1801 the young chemist published his first memoir, which treated of the dilatation of gases with rising temperature, and which was speedily followed by others, on the improvement of thermometers and barometers, on vapor pressures and the determination of vapor densities, and on capillary action In association with Biot, he was commissioned by the Institute of France to employ a balloon for observations, with the view to ascertaining whether magnetic force existed at considerable heights above the surface of the earth or only on the surface, as had been asserted by some physicists, and made two important ascents. Alexander von Humboldt investigated with him the properties of air brought down from a height of more than 23,000 feet, and their joint memoir to the Academy of Sciences (read on Oct 1, 1804) contained the first announcement of the fact that oxygen and hydrogen unite to form water in the simple proportion of one volume of the former to two volumes of the latter The simplicity of the ratio in which these gases stood to each other in their combining proportions induced Gay-Lussac to study the combining volumes of other gases and thus led him to the important discovery of the law of volumes, which was announced in 1808 and is one of the most general and important laws in the whole domain of chemistry In 1809 he was made professor of chemistry at the Ecole Polytechnique Davy's discoveries of potassium and sodium, by the decomposing action of the electric current, having excited much attention in France, Napoleon directed Gay-Lussac and Thénard to pursue this class of researches The results of their investigations appeared in two volumes, under the title *Recherches physico-chimiques*, in 1811 Among the most important of the discoveries announced in these volumes were a new chemical process which yielded potassium much more abundantly than the electrolytic method, the isolation of boron, and new and improved methods of analyzing organic compounds Gay-Lussac was also the first to obtain hydriodic and iodic acids and cyanogen He, further, investigated the manufacture of hydrated sulphuric acid, bleaching chlorides, alcohols, and alkalies employed in commerce In 1805 he was chosen a member of the Committee of Arts and Manufactures, established by the Minister of Commerce In 1818 he was appointed to superintend the government manufactory of gunpowder and saltpetre, and in 1829 he received the lucrative office of chief assayer to the mint, where he introduced several important improvements In 1831 he became a member of the Chamber of Deputies, in 1832 professor of chemistry at the Jardin des Plantes, and in 1839 he was made a peer of France He never took an active part in politics and was diligently engaged in scientific research until his last illness From 1816 he was coeditor of the *Annales de chimie et de physique*, in which many of his original memoirs were published He also wrote *Cours de physique* (1827), *Leçons de chimie* (2 vols, 1828), and other works Consult *American Journal of Science* (New Haven, 1850), and Biot and Gardeur le Brun *Notices biographiques sur Gay-Lussac* (Châlons, 1850) See CHEMISTRY, AVOGADRO'S RULE

GAY'LUSSA'CIA A genus of shrubs of the family Ericaceæ (q v), named after the French chemist J L Gay-Lussac The species, of which about 40 are natives of North and South America, bear alternate serrate or entire leaves, racemes of red, white, or reddish-green flowers, and black or blue, generally edible fruits Some species are deciduous, some evergreen The former, though hardy, are not markedly ornamental, the latter are nearly all attractive in both foliage and flower, but little cultivated in cold countries, on account of their tenderness Like their close relatives, the species of *Vaccinium*, they thrive in peaty or sandy soils and in partial shade In northeastern United States four species occur, three of which are called huckleberries

GAYN'HAM, or **GARN'HAM,** DR One of the most lax of the degraded clergymen who, while confined as prisoners in the Fleet, performed secret marriages in the eighteenth century He claimed in court to have lent himself to 2000 such marriages

GAY'NOR, WILLIAM JAY (1851–1913) An American jurist and public official He was born at Whitestown, Oneida Co, N Y, was educated at the Assumption and Whitestown academies, and studied theology for three years at the Christian Brothers College, St Louis, Mo After spending some time in travel and in teaching school at Boston he moved to Brooklyn in 1873 to study law, meanwhile supporting himself as a newspaper reporter Admitted to the bar in 1875, he moved to Flatbush, then a suburb of Brooklyn, and there fought the corrupt politicians, effected the election of a reform ticket, and was himself for a time police commissioner of that village Moving to Brooklyn proper in 1885, he carried on the same reform work, successfully opposed the attempt of Hugh McLaughlin to sell to the city for $1,500,000, a property that he had bought for $185,000, and compelled the Elevated Railroad of Brooklyn to pay more than $1,000,000 in back taxes For frauds committed when he was elected judge of the Supreme Court of New York for the term 1893–1907, Gaynor obtained the conviction of John Y McKane and 16 of his henchmen, he was reelected judge in 1907 In 1894 he had declined the nomination for Governor of New York and in 1896 for mayor of Brooklyn, and he was an unsuccessful candidate for the Democratic nomination for mayor of New York City in 1903 and for the same party's nomination for Governor in 1904. With the support of Tammany Hall he was elected mayor of New York City in 1909 by a large plurality, although the rest of the Democratic

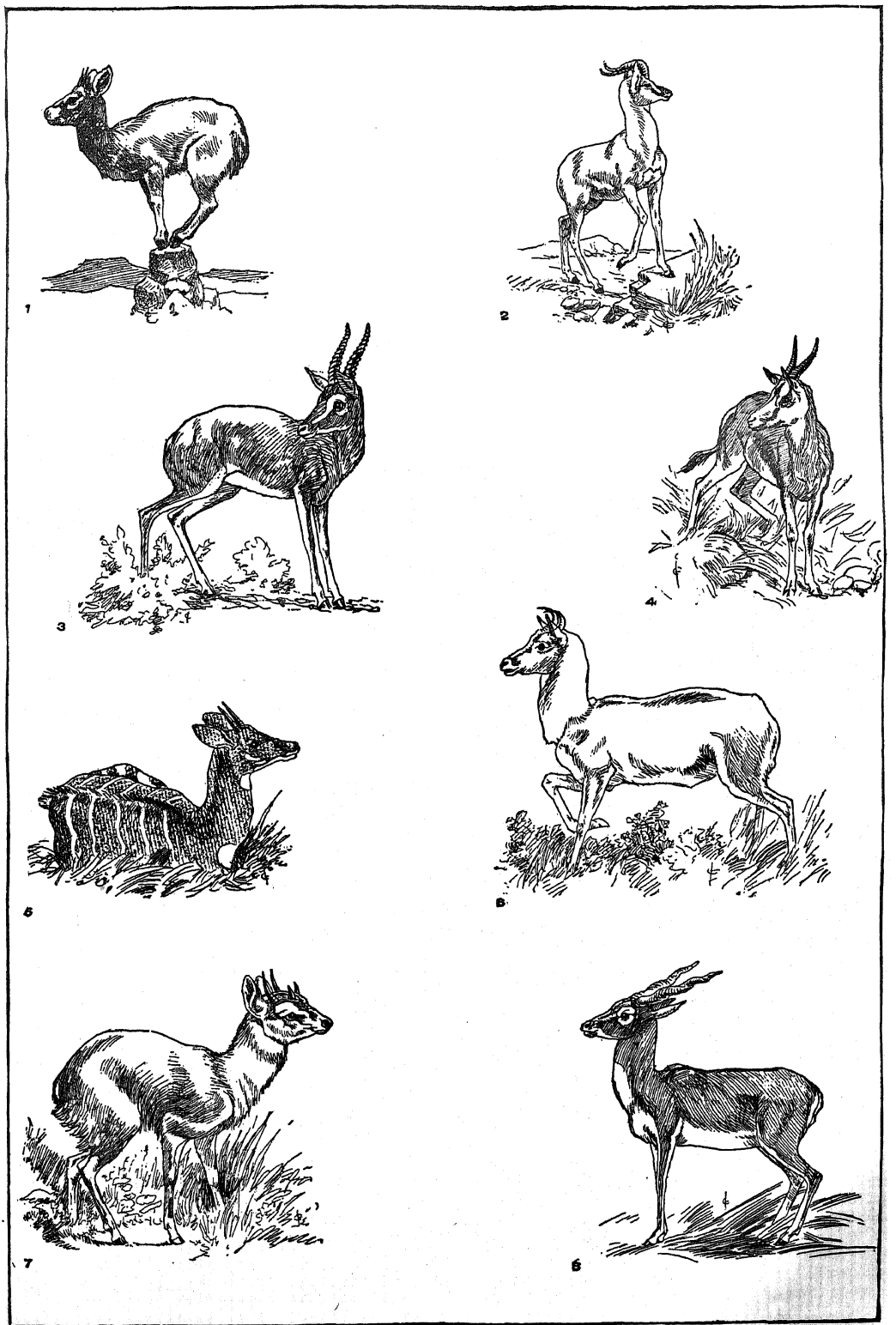
ticket was badly defeated He quickly put the city administration on an efficient business basis and thereby incurred the bitter hostility of the Tammany politicians On Aug 9, 1910, he was shot as he was boarding an ocean liner, and, though he resumed the duties of office, he never fully recovered from the effects of the wound In 1913 he was a candidate for reelection on an independent ticket, but died before election day, while on a sea voyage He acquired considerable renown through his unusual letters, which frequently were reported by newspapers *Some of Mayor Gaynor's Letters and Speeches* appeared in New York (1913)

GAY SABER, gā sa'bâr' A small association, or committee, originally known as "the very gay company of the seven troubadours of Toulouse," which met first in 1324 at Toulouse Its object was the restoration of the Provençal language and customs, and the rules which it adopted are still in force in the annual floral games held at Toulouse on May 1.

GAZA, ga'za A city in Syria, the modern Ghazzeh, 3 miles from the Mediterranean coast and about 50 miles southwest of Jerusalem It was once the most important member of the Philistine Pentapolis and a flourishing centre of Hellenistic culture and is still an emporium of trade and a place of considerable size, with a population of about 35,000 Gaza is mentioned as Gazatu in a list of places in Palestine captured by Thothmes III (1501–1447 B C) It is referred to in the Amarna correspondence under the form Khazati In the time of Rameses II it was still an Egyptian possession But the Pilisti, or Philistines, seem to have secured the city when they were repelled in their attack upon Egypt in the reign of Rameses III Probably the city was not captured by the tribe of Judah at the time of the Hebrew invasion, as stated in Judg i 18, since the editorial gloss contradicts the context In the narrative of Samson (q v.), Gaza figures prominently, and he is said to have carried away the gates of this city (Judg xvi 3). The Assyrian inscriptions do not mention the city until the reign of Tiglath-pileser IV (745–728 B C), when "Chanun, King of Gaza," resisted his attacks, was defeated, and fled to Miluhha in 734 B C In 720 B C this King again offered resistance, aided by Sibe, King of Muzri Sargon defeated him at Raphia and carried him and 9000 of his people away into captivity Gaza seems to have taken no part in the rebellion of Ashdod in 713–711 B C, or in that of Hezekiah of Judah in 701 B C, and its King Sil Bel was therefore presented with a part of Hezekiah's territory Sil Bel is mentioned as a faithful vassal of Asurbanipal (668–625 B C), and even in the time of Nabunaid of Babylonia (556–539 B C) the vassals of Gaza are mentioned During the Achæmenian period the city must have been of great importance Herodotus (ii, 159), who calls it Kadytis, says that it seemed to him not inferior to Sardis In 332 B C it was taken by Alexander only after a siege of two months, the Persian General Bates, with the aid of Arabian mercenaries, offering a stout resistance Gaza was destroyed in 96 B C by Alexander Jannæus, the Nabatæan King Aretas failing to send aid The ruined city is referred to in Acts viii 26 and also in a Greek geographer as ἐρῆμος, *erēmos*, 'desert' The port grew up into a new Gaza, later called Majuma Gazæ, or Constantia. Under the Roman administration Gaza was rebuilt and attained to a significance that it had scarcely possessed before Hellenic culture made it a rival of Antioch, Alexandria, and Athens In its temples Greek gods were worshiped, Greek art flourished among its wealthy citizens, from its schools went forth famous rhetoricians, philosophers, and poets Representatives of Neoplatonism, such as Proclus, Olympianus, and Isidor, taught in Gaza in the fifth and sixth centuries, the last of them even after the closing of the school of Athens in 529 Christianity also found here philosophically educated defenders, such as Procopius, Choricius, and Johannes But both the native faith, the worship of the god Marna (our lord), and the Greek cults continued in Gaza longer than in any other great Syrian city Omar captured the city in 634 The Crusaders found it in ruins In 1149 Baldwin II built a citadel, which he left to the Templars to defend Saladin plundered the city in 1170, but could not take the citadel until 1187 Napoleon took it in 1799 Consult Clermont-Ganneau, *Archæological Researches in Palestine* (London, 1896), Stark, *Gaza und die philistaische Küste* (Jena, 1852), Smith, *Historical Geography of the Holy Land* (London, 1895), Gatt, in *Zeitschrift des deutschen Palastina Vereins*, vol i (1888), Martin A Meyer, *A History of Gaza* (New York, 1907), Schurer, *Geschichte des judischen Volkes* (4th ed, Leipzig, 1907).

GAZA, THEODORUS (c 1398–c 1475) A famous teacher of the Greek language and literature in the West, the successor of Emmanuel Chrysoloras He was born in Thessalonica and came to Italy between the years 1435 and 1440, apparently from Constantinople The Latin language he learned under Vittorino da Feltre at Mantua, he studied it so assiduously that in three years he was a master of the tongue Soon after 1441 he was appointed professor of Greek in the newly established school at Ferrara. About 1450 Pope Nicholas V invited him, along with other learned Greeks, to Rome, where he was appointed to the chair of philosophy At this time he made a Latin translation of Aristotle's *Problemata* in mechanics and of his *History of Animals* Later he made translations of many other Greek works After the death of Pope Nicholas, King Alfonso gave him an invitation to remove to Naples in 1455, but the death of this monarch in 1458 necessitated his return to Rome, where he found a patron in Cardinal Bessarion, who obtained for him a small benefice in southern Italy, in Calabria But the learned Greek longed for Rome, to which he returned for a time under the Popes Paul II and Sixtus IV He died in Calabria about 1475 Gaza has been warmly praised by subsequent scholars, such as Politian, Erasmus, Scaliger, and Melanchthon His principal writings are his *Introductio Grammatica, Libri IV* (a work on the elements of Greek grammar, first published by Aldus Manutius at Venice, 1495 A D, and long held in high repute), a number of epistles to different persons on various literary subjects, and a variety of important translations into Latin—portions of Aristotle, Ælian, Theophrastus, St Chrysostom, Hippocrates, and other Greek writers Consult Hodius, *De Græcis Illustribus* (London, 1742), Voigt, *Wiederbelebung des klassischen Altertums*, vol ii (Berlin, 1893); Gercke, *Theodoros Gazes* (Griefswald, 1903), Sandys, *A History of Classical Scholarship*, vol ii (Cambridge, 1908).

GAZELLES AND SMALL ANTELOPES



1. KLIPSPRINGER (Oreotragus saltator).
2. NAKONG (Tragelaphus spekei).
3. COMMON or DORCAS GAZELLE (Gazella dorcas).
4. SPRINGBOK (Antidorcas euchore).
5. GUIB (Tragelaphus scriptus).
6. ISABELLE ANTELOPE (Gazella isabella).
7. CHOUSINGA (Tetraceros quadricornis).
8. BLACKBUCK (Antilope cervicapra).

GAZALAND, ga'za-land A district in southwestern Portuguese East Africa It marches with the Transvaal on the west and is traversed by the Limpopo River Gazaland is fertile and well watered Here are recruited many negroes for the Transvaal mines Portugal first got a foothold here in 1830 Three years later all her trading posts were captured by the natives In 1860, for aid against a rival, Portugal received the territory south of the Manhissa River from Umzila Upon his death (1884) she got the territory north of that river as far as the present boundary Upon the attempt to open up the hinterland a two-year border warfare broke out with the British South Africa Company (1890–91), which resulted in more firmly establishing Portugal's claims Upon the death of Gungunyano, in 1906, all serious native opposition ceased, and to-day (1914) great strides are being made in the development of the interior and exportation from the seaport towns Consult R C Maugham, *Portuguese East Africa* (London, 1906)

GAZE (ME *gasen,* from dialectic Swed *gasa,* to stare) A term in heraldry (q v), descriptive of a hart or stag represented *affrontée,* or looking full faced from the field. Such an animal is said to be at gaze

GAZELLE, ga-zĕl' (OF *gazel,* gazelle, Sp. *gazela,* from Ar *ghazal,* gazelle, from *ghazila,* to be affectionate) A name applied to various small, slender, and graceful antelopes, with large, liquid eyes and short horns About 20 species are known in southwestern Asia and northern Africa They are distinguished from each other by the length of the ringed and usually lyrate horns and by color, but the differences are often hard to define, and some zoologists regard as mere varieties what others hold to be perfectly distinct species The best-known species is the true gazelle (*Gazella dorcas*), which exhibits the typical characters of the group in their highest perfection It is of a light tawny color, the underparts white, a broad brown band along each flank the hair short and smooth The face is reddish fawn color, with white stripes at each side, inclosing a dark triangular space The horns of the old males are 9 or 10 inches long, bending outward and then inward, like the sides of a lyre, also backward at the base and forward at the tips, then tapering to a point and showing 13 or 14 permanent rings The horns of the female are smaller The ears are long, narrow, and pointed, the eyes very large, soft, and black, there is a tuft of hair on each "knee", the tail is short, with black hairs on its upper surface only and at its tip This gazelle is a native of the north of Africa, Asia Minor, Syria, and Arabia It was known to the ancients, and is described by Ælian under the name *dorcas,* which was also given to the roe deer. The speed of the gazelle is such that it cannot be successfully hunted by any kind of dog, but in some parts of the East it is taken by the assistance of falcons and is also captured in inclosures made near its drinking places Although naturally very wild and timid, it is easily domesticated, and when taken young becomes extremely familiar. Tame gazelles are very common in Asiatic countries, and Oriental poetry abounds in allusions to their beauty and gentleness

Various other species of gazelles should be mentioned The commonest species of the Sahara is Loder's (*Gazella loderi*), called "reem" by the Arabs of Algeria, which lives on berries and leaves and is said never to drink

Another species of the eastern Sahara highlands is the admi, or mountain gazelle (*Gazella cuvieri*), which often comes down at night in small bands to feed upon the grain in the valleys It is twice the weight of the dorcas, and in quickness and facility in eluding observation it is almost equal to the aoudad The common gazelle of Arabia is *Gazella arabica* Abyssinia and the open country southward have several species, among them the beautiful Kordofan species (*Gazella isabellina*), isabelline in color, with a reddish instead of the usual black tail, Grant's (*Gazella granti*), very numerous about Kilimanjaro, and having the longest horns of the genus, the long-necked greenuk (*Lithocranius walleri*), the diminutive Thomson's gazelle, and others In South Africa the springbok (*Gazella euchore*) is widespread and familiar (See SPRINGBOK) West Central Africa has several local species, of which the swift gazelle (*Gazella mohr*) and the korin are perhaps best known, and the dig-dig and dama (q v) are familiar in the Sudan For African forms consult Lydekker, *Game Animals of Africa* (London, 1908)

Of the Asiatic gazelles the Indian chinkara (*Gazella bennetti*), known to Anglo-Indian sportsmen as the "ravine deer," is the most familiar It inhabits the plains from Central India to Persia, keeps to the broken country, and is so exceedingly swift as to furnish excellent sport with greyhounds or falcons and is also much hunted with the cheeta (q v) It is light chestnut in general color above, and has long ringed horns, the buck stands about 26 inches high at the shoulders Two other species inhabit the lofty plains of Mongolia and Tibet, and a third, the Persian gazelle (*Gazella gutturosa*), is well known from the Caspian Sea to the Desert of Gobi Blandford's writings on the zoology of India and Persia contain extensive accounts of these and other Asiatic forms See ANTELOPE, and the names of various species, and Plate of GAZELLES

GAZETTE, ga-zĕt' (It *gazetta,* gazette, small coin, probably a dim of Lat *gaza,* Gk γάζα, treasure). A newspaper In 1566 the Venetian government established an official news sheet, which was not printed at first, but only written out and exhibited in public places The fee for reading it was a small coin called *gazetta* The name was soon applied to the sheet itself The London *Gazette,* founded in 1665, is the official organ of the government It appears twice a week It is recognized in law as the medium of official and legal documents Similar gazettes are published in Edinburgh and in Dublin The word *gazette* is now common as a part of the title of many newspapers See NEWSPAPER

GAZ'ETTEER' A geographical dictionary, more or less descriptive and statistical The word is connected with *gazetier,* gazetteer, a writer in newspapers, and one of the early publications of this character (that of Laurence Echard) was entitled "The Gazetteer's or Newsman's Interpreter, being a Geographical Index of all Considerable Cities, Patriarchships, Ports, etc, in Europe" The oldest-known geographical dictionary is the sixth-century fragment of Stephanus Byzantius Some of the best known of modern gazetteers in the English language are Blackie's *Imperial* (Glasgow, 1850); Alex-

ander Keith Johnston's (1850, new ed, 1877), Lippincott's *Pronouncing Gazetteer of the World* (Philadelphia, 1855, new completely rewritten ed, 1911), Longman's *Gazetteer of the World* (London, 1906) A monumental encyclopædia of universal geography is Vivien de Saint-Martin's *Nouveau dictionnaire de géographie* (Paris, 1879–1900) A very exhaustive gazetteer (as far as the number of entries is concerned) is the so-called Ritter's *Geographisch-statisches Lexikon* (Leipzig, 1874, 9th ed, 1905 et seq) On a smaller scale is the *Dizionario geografico universale* of G Garollo (Milan, 1898), a work remarkable for its accuracy As a type of special gazetteer on a magnificent scale, may be mentioned Hunter's *Imperial Gazetteer of India* (London, 1881, new ed, 1886–88) There are special gazetteers of the individual States of the American Union

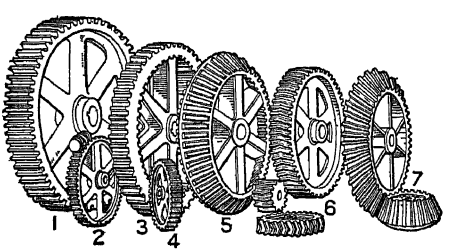
GAZ'OGENE A gas generator used in Jessie du Motay process for making illuminating gas (See GAS) Also apparatus for generating carbon dioxide in process of making carbonated waters See AERATED WATERS

GE'AN'TICLINE A broad gentle arch or dome in the outer portion of the earth, on the sides of which the strata dip or are inclined in opposite directions The structure is like that of an anticline (q v), but of larger compass One of the best illustrations is found in the Cincinnati geanticline which extends from southern Ohio to Tennessee and which dates from Paleozoic times

GEAR BOX, IN MOTOR VEHICLE See MOTOR VEHICLE

GEAR'ING (from *gear*, AS *gearwe*, from *gearu*, ready, Eng *yare*) A term applied to the parts of machinery by which motion in one part of a machine is communicated to another, gearing consists in general of toothed wheels, friction wheels, endless bands, screws, etc, or of a combination of these When the communication between the two parts of the machine is interrupted, the machine is said to be *out of gear*, and when the communication is restored, it is said to be *in gear*. Gearing has also for its object the transmission of motion or of power, or both, and is usually designed to permit the arrest or disengaging of the source of power or motion, and also to provide for the increasing or diminishing of the original velocity, and in reference to this is distinguished by the term "multiplying" or "retarding" See GEAR WHEEL

GEAR WHEEL. A toothed wheel used to transmit motion and power from one part of a



TYPICAL GEAR WHEELS

1, spur gear, 2, worm wheel and gear, 3, internal gear, 4, spur gear, 5, bevel gear, 6, V-shaped or herring-bone gear, 7, bevel gear

machine to another Gear wheels are of great variety of forms, the most common being spur wheels, in which the teeth are parallel to the axis of the wheel, bevel wheels, in which the teeth are cut radially in the face of a cone, worm wheels, in which the teeth are cut helicoidally A familiar example of spur gearing is in the works of a watch, and the ordinary chainless bicycle affords a simple example of bevel gears Forms of gear wheels and their theoretical design are found in treatises on machine design Consult Kent, *Mechanical Engineer's Pocket Book* (8th ed, New York, 1910), Reuleaux, *The Constructor* (Philadelphia, 1893), Frost, *Essential Data of Bevel Gearing* (Jackson, Mich, 1905), Beale, *Practical Treatise on Gearing* (10th ed, Providence, 1911) See ENDLESS SCREW

GEARY, gā'rĭ *or* gē'rĭ, JOHN WHITE (1819–73). An American soldier and politician He was born of Scottish-Irish parentage in Westmoreland Co, Pa, was educated at Jefferson College, but left before graduating, taught school, and then became a clerk in Pittsburgh, at the same time studying both civil engineering and law He then engaged for some time in civil engineering in Kentucky and on the outbreak of the Mexican War was superintendent of the Allegheny Portage Railway This position he resigned and helped recruit the Second Pennsylvania Volunteer Regiment, in which he became lieutenant colonel and served throughout the war After the capture of the city of Mexico he was promoted to the rank of colonel and was placed in command of the city After peace was declared he settled in San Francisco, where in 1849 he became the first American postmaster, with authority to organize post offices and mail routes on the coast, and the first American *alcalde* of San Francisco and judge of first instance for the district In 1850, upon the adoption of an American system of municipal government for the city, he was chosen its first mayor He worked for the California Free-State constitution, and was a prominent member of the convention which drew it up After serving a year as the head of the Democratic State Committee he returned in 1852 to Pennsylvania In 1856 he was appointed by President Pierce Territorial Governor of Kansas, succeeding Shannon, whose vacillation had aroused the hostility of both the Free-State and Proslavery factions Geary's rule was impartial and firm, and in a few months he restored order The Pierce administration did not support him satisfactorily, and the predominance of Proslavery men in the councils of both Pierce and Buchanan appeared to Geary to render all that he had accomplished of only temporary effect, and, disgusted with the conduct of affairs, he resigned on the day of Buchanan's inauguration At the beginning of the Civil War, Geary raised the Twenty-eighth Pennsylvania Volunteer Infantry, of which he became colonel, served with distinction in the Army of the Potomac, and was promoted brigadier general in April, 1862 He had his left arm shattered at the battle of Cedar Mountain in the following August and commanded the Second Division of the Twelfth Army Corps at Chancellorsville and Gettysburg Transferred to the Army of the Cumberland, he distinguished himself at the battles of Wauhatchie and Lookout Mountain, and in 1863–64 commanded a division on Sherman's march to the sea, failed in an attack on the strongly intrenched Confederates at Dug Gap (May 8, 1864), and was military governor of Savannah after its capture In 1865 he received the brevet rank of major

general He was elected Governor of Pennsylvania by the National Union party in 1866 and was reelected in 1869, serving until within 18 days of his death

GEBA, zhā'ba. A short river in Portuguese Guinea, West Africa, flowing in a southwestern direction through the colony and entering the Atlantic by a wide estuary At its mouth is situated the small town of Geba

GEBAL, gē'bal See BYBLOS

GEBANG (gē-bāng') **PALM** (native name), *Corypha gebang* A fan-leaved palm, native of the East Indies, where it is one of the most useful plants The trunks of this palm become 60 to 80 feet high and 2 feet in diameter, with leaves 8 to 10 feet in diameter Its stem yields a kind of sago, its root is medicinal, being both emollient and slightly astringent, so as to be particularly adapted to many cases of diarrhœa, its leaves are used for thatch, for making broad-brimmed hats, and for various other economic purposes, its young leaves are plaited into baskets and bags, in the manufacture of which many of the people of Java find employment, the fibres of its leafstalks are made into mats, ropes, baskets, nets, cloth, etc To the genus *Corypha* belongs also the talipot palm (q v)

GEBAUER, gā'bou-ēr, JAN (1838–1907) A Czech philologist, born at Ubislavicz, Bohemia, and educated at the University of Prague, where he was appointed instructor in literature and was elected to the professorship of Slavic philology in 1874 He published a number of translations from the Russian, Bulgarian, and Sanskrit, but is best known for his studies and researches into the ancient Czech language and literature such as the *Nová rada* of Simil Flaška (1876), *Zaltář Wittenberský* (1880), and, above all, by his epoch-making *Historical Czechic Grammar* (1894–98) and an Old-Czechic dictionary (1901–03, incomplete) After 1874 he was associate editor of the *Listy Filologické* His love of truth, which led him to demonstrate the spurious character of the famous Czech Koniginhof and Grunberg manuscripts, caused him many enemies among the patriotic but misguided Czechs.

GÉBELIN, ANTOINE COURT DE See COURT, ANTOINE

GEBER, gā'bēr. The name assigned to the author of a vast number of Arabic works on alchemy, astrology, and magic, as well as some of genuine scientific value Who Geber was is uncertain, and some Arabic scholars have even denied his existence His full name may have been Abu Musa (or Abdallah) Jabir ibn Hajjan al-Sufi, and it is said he lived in the eighth or ninth century He appears to have resided for some time at Cufa, and according to some Cufa was his birthplace, others say Damascus, and still others favor Harran in Mesopotamia or Tarsus in Cilicia About 26 works attributed to Geber are known by title, the manuscripts of many being in the libraries of Leyden, Paris, and elsewhere There are Latin translations of some of them, *Geberi Philosophi de Alchimia Libri Tres* (1531) and *Geberi Arabis Chimia sive Traditio Summæ Perfectionis et Investigatio Magisterii* (1668). An English translation of the latter, and of other treatises, by Russell, appeared in 1678 So great was Geber's fame that for many centuries his experiments were repeated by European chemists Roger Bacon called him *Magister Magistrorum* Consult Berthelot, *La chimie au moyen âge*, vol. iii (Paris, 1893), and Wustenfeld, *Geschichte der arabischen Aerzte* (Gottingen, 1840)

GEB'HARD, HEINRICH (1878–) An American pianist He was born in Germany, but came to America as a boy of 10 In Boston he studied piano and composition with Clayton Johns and then went to Vienna, where he remained four years under Leschetizky Immediately after his début at Boston he was accorded a place among the foremost American pianists He is especially fine as an ensemble player Besides a number of pieces for piano, he wrote a string quartet and a sonata for violin and piano

GEBHARDT, gĕp'hart, EDUARD VON (1838–1925). A German historical painter He was born at St Johannes, Esthonia, the son of a Protestant clergyman, and studied first at the Academy of St Petersburg (1855–58) and at the School of Art in Karlsruhe for the next two years, part of which he spent in traveling He finally became in 1860 the pupil of Wilhelm Sohn at Dusseldorf, where he permanently settled, and became professor at the academy in 1873 His works mark a new departure in the pictorial treatment of religious subjects in Germany, of which he is the foremost modern representative Although a thorough realist in the modern sense, he nevertheless adopted in his religious subjects the costumes of the age of Luther and Durer The chief characteristic of his paintings is their deep and powerful yet varied expression of religious feeling The more important among the many biblical scenes he painted are "Christ on the Cross" (1866, Reval), "The Last Supper" (1870, National Gallery, Berlin), one of his finest creations, masterly in characterization of the life-sized figures, "Crucifixion" (1873, Hamburg Gallery), with a strong leaning towards the Old Flemish school, "Ascension of Christ" (1881, National Gallery, Berlin), another masterpiece, life size, of more ideal conception, "Taking Care of Christ's Body" (1883) and "Jacob and the Angel" (1893), both in Dresden Gallery, "Christ and the Rich Youth" (1892) and "Sermon on the Mount" (1893), both in Dusseldorf Gallery, "Healing of the Palsied" (1895, Breslau Museum), and "Christ upon the Waters" (1902) Of episodes from the Reformation one is "The Reformer at Work" (1877, Leipzig Museum) To some Pre-Raphaelite impressions received on a visit to Italy in 1882, a cycle of six mural paintings, "Scenes from the Life of Christ" (completed 1891), in the former Cistercian monastery at Lokkum, bear witness, as do also the fine mural paintings of similar subjects in the Friedenskirche, Dusseldorf He also painted many excellent portraits, and was awarded gold medals at Berlin, Dresden, Munich, Vienna, and Paris, and was elected a member of the academies of Antwerp, Berlin, Brussels, Munich, and Vienna Consult the monographs by Rosenberg (Leipzig, 1899) and Schaarschmidt (Munich, 1899)

GEBHARDT, gĕp'hart, OSKAR LEOPOLD VON (1844–1906) A German Lutheran theologian, born at Wesenberg in Esthonia In 1893 he became chief librarian and professor of paleography in the University of Leipzig He published Theile's *Novum Testamentum Græce* (1875–1900) and *Das Neue Testament griechisch und deutsch* (4th ed, 1896), edited *The Miniatures of the Ashburnham Pentateuch* (1883); with Harnack, *Texte und Untersuchungen zur Geschichte der altchristlichen Litteratur* (1882–

1905), a serial devoted to New Testament and patristic criticism, and, with Harnack and Zahn, an edition of the apostolic fathers (1875–78)

GEBHART, gä'bar', EMILE (1839–1908) A French writer, born at Nancy and educated at the Lycée of Nancy and the French School in Athens. In 1860 he became professor of foreign literatures at Nancy and in 1879 professor of Romance literatures in the faculty of philosophy at Paris His works, aside from earlier ones dealing with the poetry and art of classic antiquity, include *Les historiens florentins de la Renaissance* (1875), *Rabelais, la renaissance et la réforme* (1876), *Les origines de la Renaissance en Italie* (1879), *L'Italie mystique* (1890), *Moines et papes* (1896, 4th ed, 1907), *Au son des cloches* (1898), *D'Ulysse à Panurge* (1902), *Jules II* (1904), *Florence* (1906), *Sandro Botticelli* (1907). In 1904 he was elected to the Academy

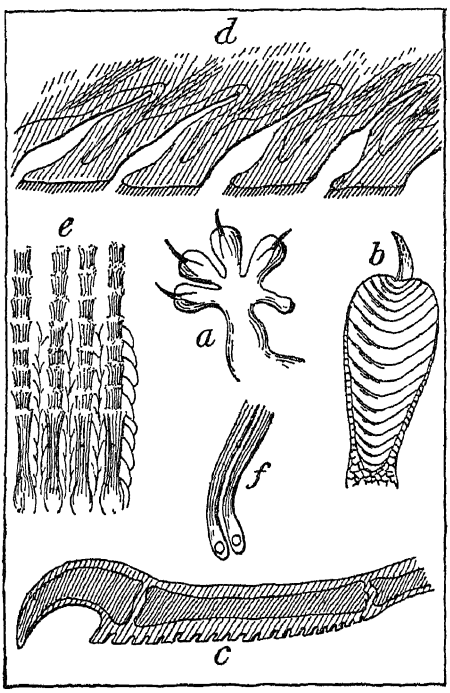
GEBIRS, gä'bĕrz See GHEBERS

GEBLER, gä'blĕr, OTTO (1838–). A German animal painter, born in Dresden He was a pupil at the academy there and afterward studied in Munich under Piloty He is an animal painter almost exclusively There is often an element of humor in his careful, finely colored works, the best of which are "Obstinate Sheep", "Disturbed Domestic Peace" (1863), "Art Critics in the Stable" (1873), National Gallery, Berlin, "Sheep and Spaniel" (1878), "Two Poachers" (1880), Dresden Gallery, "Reynard's End" (1883), New Pinakothek, Munich, "One of the Seven Sleepers," Dresden Gallery

GEBLER, TOBIAS PHILIPP, BARON (1726–86) An Austrian statesman and dramatist, born at Zeulenroda, Saxony, and educated at Jena, Halle, and Gottingen. After travels abroad he was (in 1748) appointed Secretary of Legation of the Netherlands at Berlin Five years later he entered the Austrian service, in which he found rapid promotion, rising to the rank of Vice Chancellor of the Court in 1782. He was a liberal statesman and aided in the reforms attempted by Joseph II He also tried to reform the stage and himself wrote some plays, now forgotten His *Theatralische Werke* were published in three volumes in 1772–73 His drama *Der Minister* (1771) was very popular in its day.

GEBWEILER, gäp'vī-lĕr (OHG. *Gebunwilare*). A town and industrial centre in Upper Alsace, Germany, situated on the Lauch, at the mouth of the Blumenthal, about 17 miles south-southwest of Colmar (Map Germany, B 5). It has a splendid twelfth-century church in the Transition style and a fourteenth-century Dominican church, now used as a market and concert hall Among its products are machinery, silk, cloth, cotton and woolen goods, wooden articles, sugar, soap, and brick, and especially white wines of a superior grade Gebweiler is mentioned as early as 774 Pop, 1900, 13,254; 1910, 13,024, mostly Roman Catholics Consult Dietwiler, *Gebweiler Chronik* (Gebweiler, 1898)

GECKO, gĕk'ō. A lizard of the family Geckonidæ, which naturalists have divided into many genera. The geckos are of small size and generally of repulsive aspect, the colors of most of them are dull, and the small granular scales with which they are covered are in general mingled with tubercles The legs are short, the gait usually slow, measured, and stealthy, although geckos can also run very nimbly when danger presses, and often disappear suddenly when they seem almost to be struck or caught The feet are remarkable, being adapted for adhering to smooth surfaces, so that geckos not only readily climb trees or walls, but creep inverted on ceilings or hang on the lower side of large leaves The body and tail are never crested, but are sometimes furnished with lateral



STRUCTURE OF A GECKO'S FOOT

a, the whole foot, from above, *b*, underside of a toe, with its clinging ridges, *c*, diagram of a section through a toe, showing the ridges in section, *d*, a few ridges, in section, magnified, showing their bristles, *e*, *f*, bristle cells, much enlarged (After Semper)

membranes, variously festooned or fringed, and sometimes so large as to be of use to arboreal species in enabling them to take long leaps from branch to branch Such is the case with the flying or fringed gecko (*Ptychozoon homalocephalum*) of the Malayan region The geckos feed chiefly on insects They are quarrelsome and will sometimes devour their eggs or young and even their own tails and exuviated skins They are natives of warm climates, are very widely distributed over the world, and are more or less nocturnal in their habits Two species are found in the south of Europe, both of which frequently enter houses, as do the geckos of Egypt, India, Ceylon (the "chucha"), and other warm countries Only one gecko (*Sphærodactylus notatus*) dwells in the United States, although three or four kinds are found in Lower California and Mexico It is scarcely 2 inches in length and is sparingly found in Florida and Cuba

The name "gecko" is derived from a peculiar cry often uttered by some of the species, which in some of them resembles syllables distinctly pronounced, while others are described as enlivening the night in tropical forests by a harsh cackle, such as that which gives the "croaking lizard" (*Theocodactylus lævis*), so abundant in Jamaica, its lugubrious name The geckos have, in almost all parts of the world where they are found, a bad reputation as venomous and as im-

parting injurious qualities to food which they touch, but there is no good evidence in support of any such opinion They lay a few eggs in some warm hollow of a stump, or similar place, and pay little attention to them or to the young In cool countries they hibernate Consult Gadow, *Amphibia and Reptiles* (London, 1901), and Gosse, *A Naturalist's Sojourn in Jamaica* (ib, 1851) See LIZARD

GED, WILLIAM (1690–1749). The inventor of stereotyping He was born in Edinburgh, where he was employed for some years as a goldsmith and jeweler In 1725 he took out a patent for making stereotyped plates from pages of type He met with active opposition from both compositors and type founders He was ruined financially by a man named Fenner, with whom he entered into partnership in London He procured, in 1731, a contract for printing Bibles and prayer books by his process from Cambridge University, but had turned out only two prayer books when his failure compelled his return to Edinburgh and the surrender of the contract In Edinburgh he printed, in 1744, an edition of *Sallust* from stereotyped plates, but he was never able to carry his ideas out successfully and died in poverty His sons continued the use of his patent, and it was eventually perfected by Andrew Wilson

GEDANUM See DANZIG

GEDDES, gĕd'ĕs, ALEXANDER (1737–1802) A biblical critic, translator, and miscellaneous writer He was born in Scotland in 1737, of Roman Catholic parents, and educated for a priest in his native country and in Paris, where he acquired an excellent knowledge of languages In 1764 he returned to Scotland and for 15 years held various positions as priest and became distinguished by his charities, his liberality of sentiment, and decided literary ability In 1779, in consequence of difficulties with his Bishop, he left his church, and the next year was dismissed on charges of having attended Protestant worship and gone hunting He went to London and devoted himself to literature, although he still occasionally officiated as priest till 1782 With the support of Lord Petre he was able to carry out a work long planned, viz, a translation of the Bible into English for the use of Roman Catholics After various preliminary publications to pave the way, the first volume appeared in 1792 under the title, *The Holy Bible, or the Books Accounted Sacred by Jews and Christians, otherwise called the Books of the Old and New Covenants, faithfully translated from the Corrected Text of the Original, with Various Readings, Explanatory Notes, and Critical Remarks* In 1797 the second volume was published, carrying the translation as far as the end of the historical books, and in 1800 a third volume was issued, containing his *Critical Remarks on the Hebrew Scriptures* The opinions enunciated in these volumes, especially in the last, were, for their time, startlingly heretical and approximated to some of the results of modern criticism As a result, Protestants and Roman Catholics united in their condemnation, although the translation was in the main excellent, and many of the remarks of value In 1792 his translation was interdicted by the Roman Catholic authorities in London Geddes died in London, Feb. 26, 1802, and mass was prohibited over his remains, though he had always held his loyalty to the Catholic church For his life, consult Good (London, 1803).

GEDDES, ANDREW (1783–1844). A Scottish portrait and historical painter, born in Edinburgh He was a pupil of the Royal Academy, traveled much abroad, and frequently resided in Edinburgh, but finally established himself in London in 1831 He painted some genre and historical pictures, such as "The Ascension," in the church of St James, Garlick Hill, London, "Discovery of the Scottish Regalia" (1821), "Christ and the Woman of Samaria," but was chiefly successful as a portrait painter His portraits are carefully and charmingly conceived, rich in color, and of searching characterization, but are often incorrect in line Among the best are those of William Anderson, "The Artist's Mother", Miss Charlotte Nasmyth as "Summer", "Dull Reading"—a portrait of Daniel Terry and his wife—the last three in the National Portrait Gallery, Edinburgh His copies of the old masters are highly prized Geddes was a brilliant and spirited etcher and left about 40 plates, mostly portraits

GEDDES, SIR E C First Lord of the British Admiralty. For his biography see VOL XXIV

GEDDES, JAMES (1763–1838). An American engineer He was born near Carlisle, Pa, but removed, in 1794, to Onondaga Co, N Y, where he engaged in the salt business He was one of the earliest and most active advocates of the Erie Canal and made the first surveys of the route in 1808 After serving as a member of the State Legislature and as a county judge, he was a Representative in Congress from 1813 to 1815 In 1816 he became supervising engineer of the Erie Canal and in the following year chief engineer in the construction of the Champlain Canal His success in these undertakings gave him the reputation of being the foremost canal engineer in the country, and his services were much in demand In 1827 he surveyed and laid out the line of the Chesapeake and Ohio Canal and in 1828 was made chief engineer of the State canals in Pennsylvania

GEDDES, JAMES LORRAINE (1827–87) An American soldier, born in Edinburgh, Scotland When 10 years old, he went to Canada with his family In 1843 he revisited Scotland, whence he went to India, studied at the British Military Academy, Calcutta, entered the army, and won distinction in the Punjab campaign, after which he returned to Canada In 1857 he emigrated to Vinton, Iowa He fought in the Civil War from 1861 to 1865, distinguished himself at Shiloh, Vicksburg, Corinth, and Mobile, and in 1865 was brevetted brigadier general of volunteers After the war he was principal of the College for the Blind at Vinton, and after 1870 he held different posts in the Iowa College of Agriculture in Ames He wrote some famous war songs, "The Soldier's Battle Prayer" and "The Stars and Stripes" being best known

GEDDES, JENNY Popularly supposed to have been the name of a woman who inaugurated a riot in St Giles's Church, Edinburgh, on Sunday, July 23, 1637 When the dean of Edinburgh began to read from a service book prepared by Archbishop Laud and highly obnoxious to the Scottish Presbyterians, some old woman in the congregation cried out indignantly and threw her stool at the dean's head. A great tumult ensued, which proved the deathblow of the liturgy in Scotland Who the woman really was is uncertain It has been claimed that she was the wife of one John Mein, and others say her name was Hamilton Consult *Proceedings*

of the Society of Antiquaries of Scotland, vol iii (Edinburgh, 1852)

GEDDES, PATRICK (1854–) A Scottish biologist and educator, born in Perth He was educated at University College (London), at Edinburgh and in France, and was appointed demonstrator of physiology at University College, London, of zoology at Aberdeen, of botany at Edinburgh, lecturer on natural history at the Edinburgh School of Medicine, and professor of botany at University College, Dundee Perhaps his most important work was in connection with his University Halls project at Edinburgh and Chelsea, each as a beginning of collegiate life He showed great interest in municipal art and education and also became director of a printing establishment interested chiefly in the publication of works of Celtic literature His publications include *The Evolution of Sex* (1889), with J Arthur Thompson, *Chapters in Modern Botany* (1893), *A Study in City Development* (1904), *The Masque of Ancient Learning and its Many Meanings* (1913) In an article entitled "The World's First Sociological Laboratory" (*American Journal of Sociology*, 1899), Professor Zeublin gives a very instructive account of Professor Geddes's educational experiments in Edinburgh

GED'DIE, JOHN (1821–'94) A Canadian missionary He was born in Banff, Scotland, but in infancy was brought to Nova Scotia He was ordained to the Presbyterian ministry in 1838, he founded the foreign-mission scheme of the Presbyterian church in Nova Scotia, and was the first missionary (1846) in the islands of the New Hebrides and the first to translate and to print schoolbooks, hymns, and, later, the whole of the New Testament in the language of the natives In the last-named work he was assisted by Rev. John Inglis Portions of the Old Testament were also translated During 1850–61 he wrote letters to Nova Scotia periodicals describing the islands, their inhabitants, and his missionary labors, which were recognized by his own and other churches as eminently successful He published several pamphlets and sermons, including *Memorial to the Presbyterian Synod, Nova Scotia* (1844), *The Proposed Mission to New Caledonia* (1846), *The Universal Diffusion of the Everlasting Gospel* (1846)

GE'DEN, ALFRED SHENINGTON (1857–) An English Methodist theologian, born at Didsbury, Manchester, and educated at the Manchester Grammar School and at Magdalen College, Oxford He taught theology at London University His publications include *Hebrew Exercises to Accompany the Hebrew Grammar of Gesenius-Kautzsch*, *Concordance to the Greek Testament*, with W F Moulton (1897, 3d ed, 1913), *Introduction to the Hebrew Bible* (1909), *Studies in Comparative Religion* (1898), *Studies in Eastern Religions* (1900) He also translated P Deussen's *Philosophy of the Upanishads* (1906)

GEDEN, JOHN DRURY (1822–86). An English Wesleyan minister, born at Hastings, England He was educated at the Kingswood School, and at Richmond College in Surrey He held charges at Newcastle-on-Tyne in 1851 and at Durham in 1852 and then spent three years on the Oxford circuit at Manchester In 1856 he succeeded Jonathan Crowther in the chair of sacred and classical languages at the Didsbury Theological College and soon afterward became coeditor of the London *Quarterly Review* He traveled in Egypt and in the Holy Land in 1863 In 1870 he became a member of the Old Testament Revision Company He published *The Doctrine of a Future Life as Contained in the Old Testament Scriptures* (1874) and *Didsbury Sermons* (1878)

GEDIKE, gā'dī-ke, FRIEDRICH (1754–1803) A German educator, born at Boberow, Brandenburg He studied theology at Frankfort on-the Oder and was successively director of the Werdersche Gymnasium (1779–91) and of the Kollnische Gymnasium, Berlin (1793–1803), which institutions greatly improved under his administration He greatly promoted the advancement of education throughout Prussia His works include *Schulschriften* (1789–95), *Vermischte Schriften* (1801), *Geschichte des Friedrich-Werderschen Gymnasiums*, a centenary publication (1781) Consult Horn, *Fr. Gedike* (Berlin, 1808)

GEDIMIN, gā-dē'mĭn, or **GEDYMIN** (?–1342) Grand Prince of Lithuania He fought against the Teutonic Knights and the Russians and conquered a large portion of Russia, including Kiev He was killed in an assault upon a castle of the Teutonic Knights The city of Vilna was made his capital about 1323 He tolerated Christianity, though he was a pagan

GEDON, gā'dōn, LORENZ (1843–83) A German architect, sculptor, and decorator He was born in Munich, where he studied sculpture and applied art and in 1872 made his mark with the erection of the Palais Schack Equally at home in the baroque and rococo styles, he thus gave a powerful impulse to native German art and effected a complete reform in the province of artistic crafts After applying decorative talent to the architectural arrangement and decoration of the buildings for the various industrial exhibitions in Munich in 1876, 1879, 1882, and 1883, he undertook the adornment of the German art room at the Paris Exposition of 1878, which led to a complete reform in decorating picture galleries His principal structure is the Heylshof, in baroque style, at Worms, besides which he executed much admirable work of a decorative nature in the gorgeous castles of King Ludwig II, in the town hall, and in private palaces in Munich

GEE, gē, THOMAS (1815–98) A Welsh Methodist preacher, born at Denbigh, Wales Becoming a printer, he published the quarterly magazine *Y Traethodydd*, the encyclopædia, *Gwyddonadur Cymreig*, and Dr Silvan Evans's *English Welsh Dictionary* (1868) In 1847 he was ordained a Calvinistic Methodist minister and thereafter was active in temperance and Sunday-school work In 1857 he founded the newspaper *Baner Cymru*, which was united with the *Yr Amserau* in 1859 He promoted undenominational schools and church disestablishment

GEEFS, gāfs A family of Belgian sculptors —GUILLAUME GEEFS (1806–83) was born at Antwerp, Sept 10, 1806, the son of a baker He studied at the Academy in Antwerp and in 1828 won the grand medal and a stipend, which enabled him to study in the atelier of the elder Ramey in Paris Returning to Belgium, he was appointed professor at the Antwerp Academy in 1834 Geefs was an Eclectic, whose art marks the transition from the Classical ideal to the Realistic His monuments, statues, and busts show versatility and a spirited, facile, but

superficial execution He modeled the monument of General Beelliard and in 1833 the tomb of the Count Fréderic de Merode, now in the cathedral of Brussels—the most striking of his works He designed also the monument to the victims of the revolution of 1830, in the Place des Martyrs in Brussels, and the Rubens monument in Antwerp In the Paris Exposition of 1855 he exhibited a colossal marble statue of King Leopold I of Belgium and the "Amorous Lion" (Brussels Museum) Geefs was chevalier of the Legion of Honor in France and held many Belgian orders He died Jan 24, 1883 His wife, FANNY ISABELLE MARIE, née Corr (1814–83), was very successful as a painter of genre subjects —JOSEPHS GEEFS (1808–85), brother of Guillaume, was born in Antwerp, was educated there and in Paris and Rome and was appointed professor in the Academy at Antwerp in 1841 His principal works include the statue of the anatomist Vesalius in Brussels (1848), the equestrian statue of King Leopold I in Antwerp in 1868, the statue of Van Hogendorp in Rotterdam, 1869, and the sculpture of the front of the Flemish theatre in Antwerp, 1872 —ALOYS GEEFS (1817–41), a younger brother, was also a sculptor, but of less importance Consult Bartholeyns, *Guillaume Geefs, sa vie et ses œuvres* (Brussels, 1900), and Lemonnier, *Histoire des beaux arts en Belgique* (ib, 1887).

GEEL, gāl, JAKOB (1789–1862) A distinguished Dutch scholar, born at Amsterdam, and educated at the Athenæum of that city, principally under Van Lennep After living at The Hague from the year 1811 as a family tutor, he became second librarian at Leyden in 1823 and in 1833 head librarian and honorary professor Meanwhile he had made himself known by editions of Theocritus, with the *Scholia* (1820), of the *Anecdota Hemsterhusiana* (1826), of the *Scholia in Suetonium* of Ruhnken (1828), of the *Excerpta Vaticana* of Polybius (1829), and his *Historia Critica Sophistarum Græcorum* (1823) had called forth several treatises on the same subject from German philologists In 1840 appeared his edition of the *Olympicus* of Dio Chrysostom, accompanied by a *Commentarius de Reliquis Dionis Orationibus*, and in 1846 he issued the *Phœnissæ* of Euripides, with a commentary, in opposition to Hermann. All these works, which are written in pure and pleasing Latin, are models of thorough scholarship as well as of taste and method Geel contributed further to the revival of classical learning in the Netherlands by the establishment, along with Bake, Peerlkamp, and Hamaker, of the *Bibliotheca Critica Nova* in 1825 The national literature is also indebted to him, not only for the translation of German and English works into Dutch, but also for original treatises on various æsthetical subjects He won, moreover, the gratitude of the learned throughout Europe by his liberality as a librarian and especially by his *Catalogus Codicum Manuscriptorum, qui inde ab Anno 1741 Bibliothecæ Lugduni Batavorum Accesserunt* (1852)

GEELBEC, gāl'bĕk (Dutch, yellow beak). The Dutch local name in Cape Colony, South Africa, for the commonest wild duck (*Anas flavirostris*)

GEELONG, jē'lŏng' A city of Grant Co, Victoria, Australia, picturesquely situated on the south side of Corio Bay, 45 miles southwest of Melbourne (Map: Victoria, D 6) The discovery of gold fields in the neighborhood in 1851 added to the prosperity of the city, which had become noted for its wool trade, the first mill being erected here The various industries include manufactures of tweeds, cloth, leather, flour, cement, paper, and rope, also meat preserving and fishing Since 1905, when the city voted $2,000,000 for harbor and dock improvements, a large export and brokerage trade in wool has sprung up Ships of 23 feet draft can load at the wharves, which have full railway connection The town has a produce exchange, a mechanics' institute, botanical gardens, a public park, a college, and a public library The district is exceedingly fertile Limestone, coal, and marble are found in the neighborhood Pop, 1901, 12,399, 1911, 13,618 Including suburbs, 27,000

GEELVINK (gāl'vĭnk) **BAY.** An inlet of the Pacific Ocean, on the north coast of Dutch New Guinea (Map East Indies, J 6) It penetrates 300 miles inland, nearly across the province, and receives a number of rivers

GEER AF FINSPANG, yär av fĭn'spang, LOUIS GERHARD, BARON DE (1818–96) A Swedish statesman and author, born at Finspång He was president of one of the supreme courts in 1855 and Minister of Justice from 1858 to 1870 and again in 1875 In 1876–80 he was President of the Ministry and then was chancellor of the universities of Sweden until 1888 He introduced numerous legislative reforms bearing on religion, the penal code, maritime and military laws, and copyright, and, above all, the organization of the chief legislative departments of the government, and the introduction of the two chambers with popular representation (1866) Besides several short stories and essays on æsthetics, he wrote sketches of Jarta (1874), Von Hopken (1881), and Von Platen (1886), and his own memoirs, *Minnen* (1892)

GEERTZ, gärts, JULIUS (1837–1902). A German genre and portrait painter, born in Hamburg, where he first studied under the brothers Gensler At the School of Arts in Karlsruhe, from 1856 to 1860, he was a pupil of Descoudres, then in Dusseldorf of Jordan In 1864 he went to Paris to study the old masters and after visiting Brittany and Holland settled at Dusseldorf, where his genre scenes, serious and humorous, especially those from child life, met with great favor. Besides "The Criminal after the Sentence" (1873), which made his reputation, there may be mentioned "Sour and Sweet" (Royal Château of Babelsberg), "Invested" and "Capitulated," two merry juvenile scenes, "Prisoners of War"; "Fight between Poacher and Forester" (1883), "The Village Hero" (1884) In 1890–91 he was in New York and painted portraits of Carl Schurz (Liederkranz Hall), Oswald Ottendorfer, and other prominent German Americans

GEESE. See GOOSE

GEESTEMUNDE, gā'ste-mun'de A seaport in the Prussian Province of Hanover, Germany, at the mouth of the Geeste in the Weser, directly opposite Bremerhaven, of which it is a shipping rival, 32 miles northwest of Bremen (Map Germany, C 2) The town dates from 1857, when the construction of the harbor was begun The main basin, opened in 1863, is 1846 feet long, 386 feet wide, and 23 feet deep The petroleum basin (1875) has a length of

772 feet and a breadth of 145 feet To the northwest of the main basin is the deep-sea fisheries basin (opened 1896), 3960 feet long, 364 feet wide, and 14½ feet deep It is the most important centre of the fishing trade in Germany There are large dry docks and several extensive shipyards The harbor, which is one of the largest artificial waterways in Germany, is never frozen Geestemunde has a school of marine engineering, a navigation school, and a trade school It is heavily fortified It has large works for making castings, machinery, nets, sails, rope, lumber, and timber Pop, 1900, 20,100, 1910, 25,061

GEEZ, gēz (Ethiopic *Gĕ'ĕz*) The ancient native name of the Semitic inhabitants of Abyssinia, the classical Ethiopia, and of their language, now a dead tongue The word means literally "wandering," and designates the people as "wanderers," "nomads," and their language as the speech of "freemen" See ETHIOPIA, SEMITES, SEMITIC LANGUAGES

GEFFCKEN, gĕf'ken, FRIEDRICH HEINRICH (1830–96) A German jurist, born at Hamburg and educated at Bonn, Gottingen, and Berlin He was Secretary of the Legation at Paris in 1854, represented Hamburg at Berlin in 1856, and in 1859 he was Minister of the Hanse cities at Berlin and in 1866 at London In 1872 he became professor of constitutional history and public law at the University of Strassburg In 1880–82 he was a member of the Council of State of Alsace He was a personal friend and adviser of Frederick III before and after he came to the throne, and in 1888 he was arrested at the instance of Prince Bismarck for treason, as he had published without authority in the *Deutsche Rundschau* quotations from the journal of Frederick III, which showed that Frederick and Bismarck had quarreled in 1870 After an inquiry of three months Geffcken was set free He was suffocated by gas in his bedroom His works, published anonymously, include *Die Reform der preussischen Verfassung* (1870), *Der Staatsstreich von 1851 und seine Ruckwirkung auf Europa* (1870), and *Die Verfassung des deutschen Bundesstaats* (2d ed, 1870), and, signed, *Die Alabamafrage* (1872), *Das deutsche Reich und die Bankfrage* (2d ed, 1874), *Staat und Kirche* (1875, in English by Taylor, 1877), *Zur Geschichte des orientalischen Krieges, 1853–56* (1881), *Politische Federzeichnungen* (2d ed, 1888), a volume on England, translated by Macmullan under the title *The British Empire* (1889), and *Frankreich, Russland und der Dreibund* (1893)

GEFFCKEN, JOHANNES (1861–) A German classical scholar, born in Berlin, and educated at the universities of Strassburg, Gottingen, and Bonn In 1887 he became a teacher in the Hamburg gymnasium and in 1907 professor in the University of Rostock His published work, mostly on the literature, pagan and Christian, of the early Christian period, includes *Timaios' Geographie des Westens* (1892), being the fragments of the first and second books, *Leonidas von Tarent* (1896), *Oracula Sibyllina* (1902), an excellent critical text, supplemented by his *Komposition und Entstehungszeit der Oracula Sibyllina* (1902); *Aus der Werdezeit des Christentums* (1904, 2d ed, 1909), *Das griechische Drama* (1904, 2d ed., 1909), *Zwei griechischen Apologeten* (1907); *Die christliche Apokryphen* (1908), *Kynika* (1909), *Kaiser Julianus* (1914) He was one of the revisers of the new (1914) edition of Lubker's *Reallexikon des klassischen Altertums*

GEFFRARD, zhâ'frar', FABRE (1806–79). President of Haiti He was the son of Nicholas Geffrard, one of the founders of Haitian independence, and was born at Anse Veau, Haiti In 1821 he entered the army as a private soldier, attaining the grade of captain in 1843, in which year he joined Herard in rebellion against Boyer, whom he defeated near Jacmel Having been appointed general of division in 1845, he was deprived of his command by President Riche, who was jealous of his popularity, and was tried by a court-martial After the death of Riche (1847) he regained his influence From 1849 to 1856 he was actively engaged in the army and distinguished himself in the campaign of 1856 against Santo Domingo, particularly in the retreat from San Juan Finding that it was the intention of the Emperor Faustin (Soulouque) to arrest him, he proclaimed himself President in December, 1858, and drove Soulouque from Port-au-Prince, Jan 15, 1859 In spite of the insurrections he had to repress, Geffrard gave Haiti the most moderate government it had as yet enjoyed Commerce and industry prospered with the reduction of taxes, and schools were founded in many parts of the country Nevertheless the revolutionary spirit continued active, and Salnave, who had twice attempted a rising and failed, was finally successful in February, 1867, when Port-au-Prince went over to him, and Geffrard was compelled to flee to Jamaica with French assistance, where he died

GEFFROY, zhe-frwa', EDMOND AIMÉ FLORENTIN (c 1806–95) A French actor and painter He was born at Maignelay (Oise) and studied at the College of Angers With little preliminary training he made his successful first appearance in the rôle of Orestes in *Andromaque* at the Théâtre Français (1829) and from that time until his resignation in 1865 was regarded as one of the principal actors at that theatre He played at the Odéon from 1872 to 1878 He also achieved considerable fame as a painter and was a pupil of Amaury-Duval Many of his principal works were exhibited in the Salon, such as "Charles VII and Agnes Sorel" (1839), "La Sainte Vierge et l'enfant Jésus" (1841), 'Les sociétaires de la Comédie Française" (1842); and another of the same title (1863–64), which contains portraits of Mesdames Augustine Brohan, Arnould-Plessy, Bonval, Judith, Favart, and many other distinguished actors and actresses of that celebrated theatre

GEFFROY, MATHIEU AUGUSTE (1820–95) A French historian, born in Paris He graduated at the Ecole Normale in that city in 1840 After holding professorships at the lyceums Clermont-Ferrand, Louis le Grand, and elsewhere, he was professor at Bordeaux and then at Paris and in 1875 became director of the French School at Rome His historical works deal especially with Scandinavia and French relations with it and Austria He wrote *Histoire des états scandinaves* (1851), *Des origines et de la formation de l'Europe moderne* (1853), *Marie Antoinette Correspondance secrète* (with Arneth, 1874), in which, as in other treatments on the same subject, he proved that many letters attributed to Marie Antoinette were forgeries, *Mme de Maintenon d'après sa correspondance authentique* (1887), *Etudes italiennes* (1898).

GEFLE, gĕv'lā The capital and chief commercial town of the Swedish Lan of Gefleborg, situated at the mouth of the river Gefle, about 71 miles north of Upsala (Map Sweden, F 6) The town has been in great part rebuilt since the fire of 1869 The principal buildings are the castle, the fine town hall, the library, the residence of the Governor, the high school, and a school of commerce and navigation The town is increasing in industrial importance, producing chiefly linen, sail cloth, leather, electrical machinery, lumber, paper, cotton goods, and tobacco There are also some shipbuilding and iron molding Fishing is an important industry As the chief outlet for the Kopparberg district, it carries on a large export trade in iron and lumber, imports are mainly grain, cotton, spices, textiles, and fertilizers Pop, 1900, 29,522, 1910, 31,941 Population of province or lan, 1912, 256,566

GEGENBAUR, gā'gen-bour, JOSEPH ANTON VON (1800–76) A German historical painter He was born at Wangen, Wurttemberg, and studied under Robert von Langer at the Munich Academy, and from 1823 to 1826 in Italy, where he devoted himself to fresco painting To his appreciation of Raphael his 'Expulsion from Paradise" and "Moses Striking the Rock," both in the royal palace at Stuttgart, bear witness On his return to Stuttgart he was intrusted with the execution of frescoes in the Royal Villa Rosenstein, near Cannstatt, depicting the story of "Cupid and Psyche" according to Apuleius, and "The Four Seasons" After a second sojourn in Italy, from 1829 to 1835, he was appointed court painter at Stuttgart and for nearly 20 years was employed in decorating a number of rooms in the new royal palace with episodes from the mediæval history of Wurttemberg He also painted portraits and easel pictures of religious and mythological subjects, and was a draftsman of superior skill His frescoes display invention, clear composition, animation, and vigorous coloring

GEGENBAUR, KARL (1826–1903) A German comparative anatomist He was born in Wurzburg, Germany, and studied medicine in Wurzburg, where he was a pupil of Kolliker and of Virchow, received the degree of M D and was afterward privatdocent from 1853 to 1855 In the latter year he became professor of anatomy and director of the Anatomical Institute in Jena and remained there until 1873, when he became professor of anatomy at Heidelberg He spent two years in Sicily studying invertebrate life, making important researches on pteropods and heteropod mollusks He also worked on the histology of *Limulus* He was not only the leading comparative anatomist in Germany, but one of the first class, ranking with Huxley and Owen, and was distinguished by the great range of his learning, which covered the entire field of animal morphology, as well as by the boldness of his speculations He was the first comparative anatomist to place the study of anatomy on an evolutionary basis and thus became the founder of modern anatomy His most important works are· *Grundzuge der vergleichenden Anatomie* (1870), *Grundriss der vergleichenden Anatomie* (1878), translated into English by F. J Bell, under the title *Elements of Comparative Anatomy* (1878), *Lehrbuch der Anatomie des Menschen* (1883, 3d ed, 1886); *Vergleichende Anatomie der Wirbelthiere mit Berucksichtigung der Wirbellosen* (1898) From 1876 he was editor of the *Morphologisches Jahrbuch*, which he founded In his *Comparative Anatomy of Vertebrates* (1898) Gegenbaur shows how conditions prevailing among invertebrates can be made to throw light upon the more complicated vertebrate forms Gadow characterizes this great work as "a mine of most suggestive ideas" In this, as in all his works, he strove to derive any given organ from some earlier, more ancestral or generalized structure, instead of being satisfied with its conditions or its present degree of specialization Gegenbaur's most fruitful work was his theory of the origin of limbs and their girdles from the embryonic visceral arches His views on the derivation and evolution of free limbs were also the outcome of a masterly research

GEHENNA, gē-hĕn'a (Gk Γέεννα, or Γεέννα, *Geenna*) A term used in the New Testament as a designation of the place of punishment of the wicked after death The word is a transliteration of the Aramaic *Gehennam*, or *Gehinnam*, which is an equivalent of the Hebrew *Ge Hinnom* (For origin of name, see HINNOM, VALLEY OF) In the New Testament it never refers to the valley south of Jerusalem It occurs 12 times Outside of the Synoptic Gospels it is found only in James iii 6, where the tongue is said to be set on fire by Gehenna In Luke it is used only once—viz, xii 5, where God is said to have the power of casting into Gehenna after He has killed In the corresponding passage in Matthew (x 28) the disciples are warned to fear Him who is able to destroy both soul and body in Gehenna The only passage in Mark that has the word is ix 43–47, where it occurs three times, the sacrifice of a head, a foot, or an eye being recommended in preference to Gehenna (cf Matt v 29, 30, xviii 8, 9) In addition to the parallels to the passages quoted from Mark and Luke, Matthew records three sayings of Jesus, in which He declares that the man who says *more*, i e, "thou fool," is liable to the Gehenna of fire (v 22), that the Pharisees make their proselyte twice as much a son of Gehenna as they are themselves (xxiii 15), and that the Pharisees are a brood of vipers not likely to escape the judgment of Gehenna (xxiii 33) Whether Jesus actually used the language ascribed to Him upon these occasions, and, if so, what meaning He attached to the term, are questions that have been seriously discussed without any definite agreement having been reached It will be noted that all of these statements are found only in Matthew that xxiii 23–33 seems to be a duplicate of the words of John the Baptist, and that Luke (xvii 1, 2) records the saying as to offenses that must come, without the amplifications of Matthew and Mark It is also manifest that in some instances the word is used in a figurative sense The counsel to sacrifice hand, foot, or eye can certainly not be taken literally, and there is no valid reason for supposing that Gehenna is, in the same connection, to be understood more literally Manifestly Jesus cannot have intended to draw such a distinction between an angry disposition and a contemptuous epithet like *raka*, 'empty head,' on the one hand, and a similar epithet, *more*, 'fool,' on the other hand, as to affix temporal penalties for the former and eternal punishment for the second As He cannot have desired the local courts to take cognizance of the feelings of a man's heart, or the supreme court to make a capital case of a

hasty word, but must have used *beth din* and Sanhedrim figuratively, so He is likely to have employed Gehenna in a similar way "Son of Hell" as a characterization of a hypocrite and formalist is also to be understood as a figure of speech But in Matt x 28 (Luke xii 5) Gehenna is evidently meant to be taken more literally, of man's fate after death The most natural interpretation of this passage is that the destruction of both body and soul in Gehenna means complete cessation of being But the evangelical tradition scarcely permits any definite conclusions on this point See HADES, HELL.

GEIB, gīp, KARL GUSTAV (1808–64) A German criminologist, born at Lambsheim, Bavaria He studied at Heidelberg, Munich, and Bonn In 1832 he was sent to Greece as secretary to the regency appointed during the minority of King Otho, and after his return (1834) was appointed to the chair of law at the University of Zurich (1836), where in 1842 he became professor of criminal and civil procedure In 1851 he went to Tubingen Geib was a strict adherent of the historical method The work entitled *Geschichte des romischen Kriminalprozesses bis zum Tode Justinians* (1842), although superseded by more recent investigations, had an extraordinary influence in Germany Consult the biographical sketch by Lueder (Leipzig, 1864)

GEIBEL, gī'bel, EMANUEL (1815–84) A popular German lyric poet He was born at Lubeck, Oct 17, 1815, was graduated at Bonn (1836), lived for two years in Berlin in literary society, went as tutor to Athens (1838), traveled extensively with Ernst Curtius in the Grecian Archipelago, and returned to Lubeck in 1840 He led a studious life there and on the Rhine, at Stuttgart, Hanover, and Berlin, received a pension from the King of Prussia in 1843, and in 1852 was made professor of æsthetics at Munich He returned to Lubeck in 1868 and resided there till his death, on April 6, 1884 His fame rests chiefly on his lyric poetry *Gedichte* (1840), *Juniuslieder* (1848), *Neue Gedichte* (1856); *Gedichte und Gedenkblatter* (1864), *Spatherbstblatter* (1877), and the posthumous *Gedichte aus dem Nachlass* (1896) He wrote also two tragedies—*Brunhild* (1858) and *Sophonisbe* (1868)—and a comedy, *Meister Andrea* (1865) He collaborated with others in several volumes of noteworthy translations—viz, *Klassische Studien*, with Ernst Curtius (1840), *Volkslieder und Romanzen der Spanier* (1843), *Spanisches Liederbuch*, with Paul Heyse (1852), *Funf Bucher franzosischer Lyrik*, with Leuthold (1862) Selected translations from Greek and Latin poets appeared as *Klassisches Liederbuch* (1875) Geibel's *Works* are in eight volumes (3d ed, 1893), his correspondence is contained in part in *Briefe an Karl Freiherrn von Malsburg* (1885) Geibel's lyric gift was genuine, but marked rather by a talent for carefully and skillfully chiseled form than for strong, virile content For his biography, consult Goedeke (Stuttgart, 1869), Litzmann (1887), Leimbach (Wolfenbuttel, 1894), Gaedertz (Leipzig, 1897), and also Predels, *E Geibel und die franzosische Lyrik* (Munster i W., 1905)

GEIERSTEIN, gī'er-stīn, ANNE OF See ANNE OF GEIERSTEIN

GEIGER, gī'gēr, ABRAHAM (1810–74) A distinguished rabbi and Jewish scholar He was born at Frankfort-on-the-Main and was educated at Heidelberg and Bonn At Bonn he gained a prize for an essay on the Jewish sources of the Koran, published (1833) under the title *Was hat Mohammed aus dem Judentum aufgenommen?* (reprint of Eng trans, Madras, 1898), which is still of considerable value In 1832 he became rabbi in Wiesbaden and in 1835 one of the editors of the *Zeitschrift fur judische Theologie* In 1838 he was chosen associate rabbi at Breslau, in 1863 he removed to Frankfort, where he was rabbi until 1870, and was then elected to the charge of the largest Jewish congregation in Germany—viz, at Berlin—and remained there till his death, in 1874 From 1862 to the end of his life he published at Breslau *Judische Zeitschrift fur Wissenschaft und Leben* (11 vols) Geiger's work was mainly in theological lines, and he was one of the foremost advocates of the "reform" of Judaism, standing for liberality in the construction and observance of the Jewish traditional law In line with this work he published a new Hebrew ritual and became professor in the Hochschule fur die Wissenschaft des Judenthums, a school to train Jewish rabbis according to the modern interpretation of Judaism, which he had helped to found Endowed with an unusually active mind, he worked untiringly, and of his extremely numerous works on Jewish history, literature, and theology, only a few can be mentioned here. *Lehr- und Lesebuch zur Sprache der Mischna* (1845), *Beitrage zur judischen Litteraturgeschichte* (1847), *Diwan des Castiliers Abu'l-Hassan Juda ha-Levi* (1851), the two very important works, *Urschrift und Uebersetzungen der Bibel in ihrer Abhangigkeit von der innern Entwickelung des Judentums* (1857) and *Sadduzaer und Pharisaer* (1863), a collection of lectures published under the title *Das Judentum und seine Geschichte* (1864–71), and *Salomo Gabirol und seine Dichtungen* (1868) His posthumous works, *Nachgelassene Schriften*, were published by his son Ludwig, the last volume of this collection contains his biography and letters The most important of his works is the *Urschrift*, an exceedingly valuable contribution to the history of Old Testament literature

GEIGER, LAZARUS (1829–70) A German philologist, born at Frankfort-on-the Main He studied at Bonn, Heidelberg, and Wurzburg During the last nine years of his life he was instructor in German, Hebrew, and mathematical geography at the Jewish High School of Frankfort His principal philological works are respectively entitled *Ursprung und Entwickelung der menschlichen Sprache und Vernunft* (2d ed, 1899, Eng trans, 1880) and *Der Ursprung der Sprache* (1869) Consult L Rosenthal, *L Geiger* (Stuttgart, 1884)

GEIGER, LUDWIG (1848–) A German author and historian, born at Breslau After study at Heidelberg, Gottingen, and Bonn, he became docent in history at Berlin in 1873 and in 1880 was appointed to a chair of modern literature there His more important researches have been concerned with the history of humanism, to which he contributed such studies as *Nikolaus Ellenbog, ein Humanist und Theolog des sechzehnten Jahrhunderts* (1870), *Johann Reuchlin, sein Leben und seine Werke* (1871), *Petrarca* (1874), an examination of Petrarch's significance as author and scholar, and *Renaissance und Humanismus in Italien und Deutschland* (1882) He also revised Jakob Burckhardt's *Die Kultur der Renaissance in Italien* (7th ed, 2 vols, Leipzig, 1899) In 1880 he began the publication of the *Goethe-Jahrbuch*

and from 1886 to 1892 was proprietor and an editor of the *Zeitschrift fur Geschichte der Juden in Deutschland* (5 vols), in connection with which subject he published *Das Studium der hebraischen Sprache in Deutschland vom Ende des 15ten bis zur Mitte des 16ten Jahrhunderts* (1870) and *Geschichte der Juden in Berlin* (1871) Other works are *Vortrage und Versuche* (1890), *Berlin 1688–1840* (1893–95), *Das junge Deutschlass und die preussische Zensur* (1900), *Bettina von Arnim und Friedrich Wilhelm IV* (1902), *Aus Chamissos Fruhzeit* (1905), *Goethe und Zelters Briefwechsel* 1905), *Chamissos Leben* (1907), *Chamissos Werke* (1907), *Der Briefwechsel Goethes mit Humboldt* (1908), *Charlotte von Schiller* (1908)

GEIGER, NIKOLAUS (1849–97). A German sculptor and painter, born at Lauingen, Bavaria He was a pupil of Knabl at the Munich Academy In 1873 he went to Berlin and soon became known through ornamental work in the Tiele-Winckler Palace After a visit to Italy he studied painting in Munich and in 1884 returned to Berlin, where he was awarded a gold medal in 1886, was elected member of the academy in 1893, and was made professor in 1896 His most important works in Berlin are the groups of "Inspiration" and "Homage of Art" (1886), in the Exhibition Building, the high relief "Adoration of the Magi" (1894), in St Hedwig's Church, the statue of Barbarossa for the Kyffhauser monument, a statue of "Work," for the National Bank, Berlin, and "Centaur and Nymph," in the National Gallery A frieze in relief for the Soldiers' Monument at Indianapolis may also be mentioned His style is decorative, with a leaning towards the pictorial His painting, "The Communion of the Saints," on the ceiling of St Hedwig's, Berlin, is the most noteworthy

GEIGER, WILHELM (1856–) A German Orientalist He was born at Nuremberg and was educated at the University of Erlangen, where in 1891 he became professor of Sanskrit and Indo-Germanic philology In 1905 he became a member of the Landtag of Bavaria He wrote *Handbuch der Awestasprache* (1879), *Ostiranische Kultur* (1882), translated into English as *The Eastern Iranians* (London, 1885), *Elementarbuch der Sanskrit-Sprache* (2d ed, 1909), *Ceylon* (1898), *Litteratur und Sprache der Singhalesen* (1901), and, as co-editor, *Grundriss der iranischen Philologie* (2 vols, 1885–1905), to which he contributed the portions on Afghan, Baluchi, and minor Iranian dialects, and on the geography of Iran He also wrote *Dīpavamsa und Mahavāmsa und die geschichtliche Ueberlieferung in Ceylon* (1905), and *Mahavāmsa* (1908–12)

GEIJER, yī'ĕr, ERIK GUSTAF (1783–1847) A Swedish historian, poet, and composer, born at Ransater, Varmland, Jan 12, 1783, of parents who were of Austrian descent He was educated at the Gymnasium of Karlstad and at the University of Upsala and in 1803 competed successfully for an historical prize offered by the Academy of Sciences at Stockholm In 1806 he obtained his master's degree from Upsala and in 1809 traveled in England The year following he became a lecturer in history at Upsala and in 1815 assistant to Fant In 1817, on the death of his chief, Geijer was made professor in his place In 1824 he was elected a member of the Swedish Academy Geijer was hardly less famous as a poet than as an historian, and he exercised a marked influence on the poetic literature of Sweden According to the testimony of his countrymen, his *Sista Skalden*, *Vikingen*, *Odalbonden* and other heroic pieces place him in the foremost rank of Swedish poets He and his friends Adlerbeth, Tegner, and Nikander adhered to the Gothic school of poetry, which owed its origin to the Society of the Goths, established as early as 1810, they published at the same time a magazine, *Iduna* (1811–24), in which first appeared several of Geijer's best poems Great as is the value of Geijer's historical works, he did not complete any one of the vast undertakings which he planned Of the *Svea Rikes hafder* (or Records of Sweden), which were to have embraced the history of his native country from mythical ages to his own times, he finished only the introductory volume His *Svenska folkets historia* (3 vols, 1832–36), which was intended to form one of the series of European histories edited by Leo and Ukert, was not carried beyond the abdication of Queen Christina (1654), the reason probably being the author's conversion to liberalism in history and politics, yet, incomplete as they are, these works rank among the most valuable contributions to Swedish history. To Geijer was intrusted the task of examining and editing the papers which Gustavus III (q v) had bequeathed to the University of Upsala, with the stipulation that they were not to be opened for 50 years after his death In fulfillment of his charge Geijer arranged these papers in a work which appeared in 1843–45 under the title of *Gustaf III s efterlemnade papper*, but they contained little or nothing of value During the last 10 years of his life Geijer took an active part in politics, but although his political writings possess great merit, the very versatility of his powers diverted him from applying them methodically to the complete elaboration of any one subject In 1828–30 and 1840–41 he was a member of the Swedish Diet as a representative of his university In addition to being an historian, poet, and publicist, Geijer was well known as a musician and composer of no mean order He set many of his own songs to stirring music, and hymns of his rendering appear in the Swedish Service Book In 1814–15 he cooperated with Afzelius in producing a three-volume edition of Swedish folk songs of the Middle Ages In 1846 increasing ill health forced him to resign his position as professor at Upsala He died April 23, 1847, at Stockholm He left some personal memoirs of value, *Minnen* (Upsala, 1834) His collected works, *Samlade Skrifter*, with a bibliographic treatise by Teodblad (8 vols), appeared at Stockholm (1873–75) His *History of the Swedes* down to Charles X was translated into English by Turner, with biographical introduction (London, 1845) For brief biographical treatises, consult Malmstroem (Upsala, 1848), Fries (Stockholm, 1849), Carlson (Stockholm, 1870), Nieksen (Odense, 1902)

GEIKIE, gē'kĭ, SIR ARCHIBALD (1835–1924) A distinguished British geologist, born in Edinburgh, where he attended the high school and university Becoming a member of the Geological Survey of Scotland under Murchison, he was raised in 1867 to the office of director From 1871 to 1882 he held the Murchison professorship of geology and mineralogy in the University of Edinburgh, resigning the position

to become director general of the Geological Survey of the United Kingdom and director of the Museum of Practical Geology in London He retired from these offices in 1901 Geikie rose to be an eminent authority and contributor on geological subjects His studies in morganic geology, particularly physiography, dynamism, and the structure of the earth, show a keen appreciation of natural processes, while his geological textbooks are models of arrangement, general balance, and facility of expression He received the honorary degree of D C L from Oxford, that of D Sc from Cambridge and Dublin, and that of LL D from Edinburgh, Glasgow, Aberdeen, St Andrews, and other British universities In 1891 he was elected president of the Geological Society of London and was knighted He also served as president of the British Association for the Advancement of Science and as president of the Royal Society (after 1908) In 1897 Geikie visited the United States to deliver the first series of lectures on the George Huntington Williams foundation at Johns Hopkins University. He was created K C B in 1907, was awarded the Order of Merit in 1914, received gold medals from numerous scientific societies at home and abroad, and became a corresponding member of the French Institute Among his more important works, some of which have passed through several editions, are *Scenery of Scotland, Viewed in Connection with its Physical Geography* (1869), *Field Geology* (1879), *Text Book of Geology* (1882), *Class-Book of Geology* (1886), *Ancient Volcanoes of Britain* (1897), *The Founders of Geology* (1897, 2d ed, 1906), *Types of Scenery and their Influence on Literature* (1898), *Scottish Reminiscences* (1904), *Landscape in History* (1905), *Love of Nature among the Romans* (1912)

GEIKIE, CUNNINGHAM (1824–1906). An English clergyman and writer He was born in Edinburgh. He studied at Queen's College, Toronto, Canada, held Presbyterian pastorates at Halifax, Nova Scotia, and at Toronto, and later in England In 1876 he took priest's orders in the English Establishment and was successively settled in Dulwich (1876), Paris (1879), Barnstaple (1883), and Norwich (1885) He retired to Bournemouth in 1890 His wide fame rests upon his *Life of Christ* (1876), his history of the *English Reformation* (1878), *Hours with the Bible* (12 vols, 1880–96), *The Holy Land and the Bible* (1887)

GEIKIE, JAMES (1839–1915) A Scottish geologist and author, brother of Sir Archibald Geikie, born at Edinburgh He was educated at Edinburgh University, was appointed an assistant in the British Geological Survey in 1861, and in 1869 was made director of the Survey in Scotland In 1882 he was elected to succeed his brother as Murchison professor of geology and mineralogy at Edinburgh University, where later he was made dean of the faculty of science He wrote much on various geological subjects and especially those connected with glacial geology His works include *The Great Ice Age* (1874, 3d ed, 1894), *Prehistoric Europe* (1882, 4th ed, 1903), *Outlines of Geology* (1884, 4th ed, 1903), *Songs and Lyrics of Heinrich Heine and Other German Poets* (1887), *Fragments of Earth-Lore* (1892), *Earth Sculpture or, The Origin of Surface Features* (1889, 2d ed, 1909), *Structural and Field Geology* (1905, 3d ed, 1912), *Mountains Their Origin, Growth, and Decay* (1913), *The Antiquity of Man in Europe* (1913)

GEIL, gīl, WILLIAM EDGAR (1865–1925) An American explorer and author He was born near Doylestown, Pa, was educated at Doylestown Seminary, attended Lafayette College in 1890, and made archæological studies in western Asia in 1896 In 1901 he started on a four-year world journey for comparative study of primitive peoples He traveled in all parts of China, explored the Great Wall, and penetrated the pigmy forest of Africa He also lectured in China, Japan, India, Australia, Great Britain, and the United States His publications include *Pocket Sword* (1895), *Laodicea* (1898), *The Isle that is Called Patmos* (1898, 1905), *Ocean and Isle* (1902), *A Yankee on the Yangtze* (1904), *The Man of Galilee* (1904, 1906), *A Yankee in Pigmyland* (1905), *The Men on the Mount* (1905), *The Automatic Calf* (1905), *Cannibals Before and After* (1907), *The Great Wall of China* (1909, 1911), *Eighteen Capitals of China* (1911)

GEILER VON KAYSERSBERG, gī'lēr fŏn kī'zērs-bĕrk, JOHANN (1445–1510) A famous German Catholic mystic and popular preacher, born at Schaffhausen, but brought up by his grandfather at Kaysersberg (Alsace), whence his epithet He was educated at Ammersweier and at Freiburg and soon after his taking orders went (1471) to Basel, where he became dean of the philosophic faculty (1474) and a professor of theology (1475) A year later he returned to Freiburg and became rector of the university In 1478 he became preacher at the cathedral of Strassburg and held this office for 32 years In the nave of the cathedral is the pulpit built for him in 1481 He has been called "the German Savonarola" Of his sermons, the best known are the cycle based on Brant's *Narrenschiff* (1494) and called *Navicula sive Speculum Fatuorum* (1510) In the same satiric form and showing the same power and religious depth are *Das Schiff der Penitenz* (1514), *Der Seelen Paradies* (1510), and *Christliche Pilgerschaft* (1512), all first composed in Latin and delivered in German His more important works may be found in De Lorenzi, *Geilers ausgewählte Schriften* (1881–83), with a biographical sketch, and an excellent biography and general criticism in Godeke, *Grundriss zur Geschichte der deutschen Dichtung*, vol 1, p 397 et seq (1884) Consult Dacheux, *Un reformateur catholique à la fin du XVe siècle* (Paris, 1876), on which is based Lindemann, *Johann Geiler von Kaisersberg* (Freiburg, 1877), and Schmidt, *Histoire littéraire de l'Alsace à la fin du XVème siècle* (Paris, 1879)

GEILFUS, gīl'fōōs, GEORG (1815–91) A Swiss historian, born at Lampertheim, Germany He studied at Giessen, and from 1856 to 1868 was superintendent of schools of Winterthur Besides numerous minor writings, historical and biographical, he published the important work entitled *Helvetia Vaterlandische Sage und Geschichte* (4th ed, 1879)

GEINITZ, gī'nĭts, HANS BRUNO (1841–1900). A German geologist, born at Altenburg and educated at Berlin and Jena He was appointed professor of mineralogy and geognosy at the Polytechnic Institute of Dresden in 1850 and was director of the Museum of Mineralogy there from 1857 to 1894 His works include *Charakteristik der Schichten und Petrefakten des sachsisch-bohmischen Kreidegebirges* (1843);

Die Versteinerungen der Steinkohlenformation in Sachsen (1855), *Geologie der Steinkohlen Deutschlands und anderer Länder Europas* (1865), *Carbonformation und Dyas in Nebraska* (1866), *Geologie von Sumatra* (1875), *Ueber fossile Pflanzen und Tierarten in den argentinischen Provinzen San Juan und Mendoza* (1876)

GEISHA, gā'sha (Chino-Japanese, person of pleasing accomplishments) One of a class of young women in Japan endowed with more than the ordinary share of personal attractions, elegant and accomplished in the arts of gayety and especially in music and the peculiar rhythmic dances of the country which form the chief feature at entertainments in the average social life of Japan It is customary to speak of geishas as "singing girls" They correspond in some degree to the Almech of Egypt and other parts of the Orient Usually the training of the girl begins when she is seven years old The geisha is the imposing theme of a large number of rhapsodical and erotic writers on Japan, but in the new and better social life of Japan and reconstruction in national habits and ideals the solution of the geisha problem is a serious one A capitation tax of one yen per month is levied on each geisha. Consult Bacon, *Japanese Girls and Women* (Boston, 1891), Chamberlain, *Things Japanese* (London, 1891), Griffis, *The Japanese Nation in Evolution* (New York, 1911), Lloyd, *Everyday Japan* (London, 1911), Nitobé, *The Japanese Nation* (New York, 1912)

GEISHUSLER, gīs'hus-lēr, OSWALD See MYCONIUS, OSWALD

GEISSEL, gīs'el, JOHANNES VON (1796–1864). A German Roman Catholic prelate He was born at Gimmeldingen in the Palatinate and was educated at the Episcopal Seminary in Mainz He was ordained a priest in 1818 In 1819 he was appointed professor at the Gymnasium of Speyer, and three years later became canon of the chapter. He was made dean in 1836 and Bishop in 1837 In 1842 he became the coadjutor, and three years later the successor, of the Archbishop of Cologne After the revolution of 1848 he was chosen a member of the Prussian Constituent Assembly, and largely through his influence the independence and rights of the church in Prussia were assured by the new constitution In 1850 he was made Cardinal He was a zealous defender of the Ultramontane position in Germany and distinctly favored the Jesuits One of his most noteworthy achievements was the suppression of Hermesianism. (See HERMES, GEORG) The long-delayed completion of the Cologne Cathedral was undertaken about the time of his appointment as coadjutor, and in 1863 he celebrated its completion, except the towers His writings, edited by Dumont (Cologne, 1869–76), include addresses, poems, and miscellaneous writings, and Dumont edited *Diplomatische Correspondenz über die Berufung des Bischofs Johannes von Geissel* (Freiburg, 1880) Consult the biography by Pfulf (Freiburg, 1895–96)

GEISSLER, gīs'lēr, HEINRICH (1814–79) A German scientific-instrument maker, born at Igelshieb, Saxe-Meiningen After acquiring considerable proficiency as a glass blower, he established at Bonn, in 1854, his well-known factory for making chemical and other scientific apparatus. He was noted for his inventive genius and also for the excellence of the scientific instruments of his manufacture. The celebrated mercurial air pump used for obtaining high vacua, and known as the Geissler pump (see AIR PUMP), was first constructed by him, as were also the well-known Geissler's tubes

GEISSLER'S TUBES The general name for sealed vessels arranged to show the brilliant effects of electricity passed through rarefied gases They usually consist of glass tubes and bulbs with platinum wires inserted to form the electrical connections These tubes are filled with various rarefied gases and show an infinite variety of delicate lights in figures or patterns, depending upon the shape of the tubes, the arrangement of the wire connections inside, the gas contained, and the degree of rarefaction The effects produced, besides being very curious, are of value to the investigator, as they afford a means of examining various incandescent gases with the spectroscope, and numerous other experiments

GEIST, gīst (Ger, spirit) Used oftenest in the compound term *Zeitgeist*, or 'spirit of the age,' 'time spirit,' introduced into English literary language by Matthew Arnold

GEITNER, gīt'nēr, ERNST AUGUST (1783–1852) A German chemist, born at Gera After conducting a chemical factory at Lossnitz he founded another at Schneeberg, in 1815, which he conducted until his death He was eminent as a chemical investigator and was the discoverer of the alloy *argentan*, or German silver He also devoted considerable attention to the chemistry of dyeing and was the first to utilize chromic salts for animal and vegetable dyes He published *Briefe über die Chemie* and *Die Familie West, oder Unterhaltungen über Chemie und Technologie*

GEI'TONOG'AMY. See POLLINATION.

GE'LA (Lat, from Gk. Γέλα) In ancient times an important town on the southern coast of Sicily, on the river of the same name It was founded by a Rhodian and Cretan colony (about 690 B C) Its rapid prosperity may be inferred from the circumstance that as early as the year 582 B C Agrigentum was founded by a colony from Gela After Cleander had made himself tyrant in the year 505 B C, the colony reached its highest power under his brother Hippocrates (498–491 B C), who subdued much of east Sicily. Gelon, the successor of Hippocrates, pursued the same career of conquest, and Syracuse itself fell into his hands and was even made his principal residence, Gela being committed to the government of his brother Hiero. Here Æschylus, after having been honorably received by Hiero, died and was buried about 456 B C During the Carthaginian wars Gela suffered greatly (405 B C), but its ruin was completed by Phintias, of Agrigentum, who before 280 B C removed the inhabitants to a town in the neighborhood which he had founded and named after himself Its site is believed to be occupied by Terranova, at the mouth of the Fiume di Terranova For the excavations there, consult Lubker, *Reallexikon des klassischen Altertums*, 8th ed (Leipzig, 1914).

GELADA (jĕl'a-da) **BABOON** See BABOON

GELA'SIUS The name of two popes 1 GELASIUS I (Pope, 492–496). He restated the supremacy of Rome over Constantinople and insisted on the removal of the name of Acacius, Bishop of Constantinople, from the official list of holy persons for whom prayers were to be offered During his pontificate the canonical books of the Old Testament were determined by a council at Rome. He vigorously opposed the

Manichæan, Pelagian, and Arian heresies, and defended the purity of Christian life against immoral heathen practices After his death he was canonized, his day being November 18 His works are in Migne, *Patrol Lat*, lix (Paris, 1844–80) Consult his life by Roux (Paris, 1880), the *Gelasian Sacramentary*, ed by Wilson (Oxford, 1894), McKilliam, *Chronicles of the Popes from St Peter to Pius X* (New York, 1912) 2 GELASIUS II (Pope, 1118–19) He was born of noble descent at Gaeta about 1050 He received his theological education in the abbey of Monte Cassino and afterward held the office of cardinal deacon under Urban II and of chancellor under Paschal II On the death of Paschal II he was elected Pope by the cardinals Cencius Frangipani, a partisan of the Emperor Henry V, laid violent hands upon him and threw him into prison, but he was set at liberty through the general uprising of the people in his behalf The sudden appearance of the Emperor, however, compelled him to leave Rome for Gaeta, and the Imperial party chose an antipope, Burdinus, Archbishop of Braga, Portugal, under the name of Gregory VIII Gelasius held a council at Capua and excommunicated his rival and the Emperor Returning to Rome, under the protection of the Norman princes, he lay concealed for a while narrowly escaping capture once more by the Frangipani, and, after wandering through Italy and France, died at Cluny in 1119 His letters are in Migne, *Patrol Lat*, clxiii (Paris, 1844–80) Consult H K Mann, *Lives of the Popes in the Middle Ages* (9 vols, St Louis, 1914)

GELASIUS A SANTA CATHARINA. See DOBNER, JOB FELIX

GELATIN (from Neo-Lat *gelatina*, from Lat *gelatus*, p.p of *gelare*, to freeze, from *gelu*, frost), or GLUTIN (not *gluten*) A term applied to the purest form of glue Gelatin is not found as such in animal tissues, but is obtained by the hydrolytic action of hot water or hot dilute acids on protein substances of the albumenoid or sclero-protein type, principally collagens. Skins or hides, tendons, hoofs, bones, muscle, intestines, bladders, etc, are utilized for making gelatin and glue The former, however, is usually prepared from selected connective tissue in skins and bones and appears as a yellowish, transparent, brittle, tasteless, and odorless substance. The ordinary commercial process for preparing gelatin consists in carefully washing the connective tissue employed, then cutting it and digesting in a dilute solution of soda lye for 10 days at a moderate heat. The material is then removed into an air-tight chamber lined with cement, where it is heated at a temperature of 70° F. It is next transferred to revolving cylinders supplied with an abundance of clean cold water for washing and afterward is placed in another chamber, lined with wood, where it is bleached and purified by exposure to the fumes of burning sulphur, after which it is washed with cold water to remove traces of sulphurous acid. The next operation is to squeeze it as dry as possible and transfer it to the gelatinizing pots, which are large earthen vessels inclosed in steam-tight wooden cases Into these vessels water is poured, and the mass is kept at a high temperature by means of steam coils surrounding the pots By this process the gelatin is dissolved out of the tissue and is strained off while still hot. It is then poured out in thin layers, which, as soon as they are sufficiently cool and consolidated are cut into small oblong plates and laid on nets to dry If the solution is dark-colored, it may be purified by treatment with animal or vegetable charcoal The gelatin of bones may be extracted on a large scale by the combined action of steam and a current of water trickling over their crushed fragments in a properly constructed apparatus When the gelatin is to be used as an article of food, the bones must be quite fresh, well preserved in brine, or dried by a stove, and should be crushed by passing between grooved iron rollers The purification of commercial gelatin may be effected by soaking in distilled water for some days in order to remove salts, dissolving in hot distilled water, and filtering while hot into 90 per cent alcohol The gelatin then separates in the form of white thready masses, which can be subsequently dried The pure gelatin thus obtained contains only about ½ per cent of ash The ash of a high-grade gelatin should not exceed 2 per cent and should contain no heavy metals, such as copper Glue may have 4 per cent or more of ash The limit of sulphur dioxide (SO_2) in a standard gelatin is generally accepted as not more than 5 parts per 100,000 It should contain no appreciable amount of chondrin, a horny substance derived from cartilage and having a lower gelatinizing power than gelatin When soaked in cold water for four hours and then made into a jelly by heating in water, it should give no offensive odor

Although gelatin is classed as a protein, it differs from other proteins in dissociation products and in properties and cannot be considered a true protein food It is known as a protein sparer and as such has a food value

Gelatin is soluble in concentrated acetic and mineral acids, if thus treated, it loses its gelatinizing property, but the solution may be used as a cement for glass and for certain other purposes In contact with cold water it takes up from 5 to 10 times its weight, swelling to an elastic transparent mass, which readily dissolves in warm water. On cooling, the solution "gelatinizes," and thus gelatin is extensively used for culinary purposes, being employed as a vehicle for other materials, e g, in making jellies Gelatin is further used in taking casts and impressions for electrotyping, and besides being employed for gelatin dry plates in photography, it is used in the carbon processes of photographic printing, which depends on the power of certain bichromates to render the gelatin insoluble when exposed to the action of light. This last property has also led to the use of gelatin as an insoluble glue or waterproofing material Gelatin is one of the ingredients of printers' rollers, it is also employed in dyeing and as a size in paper making and painting As a fining, it is employed in beer brewing, and it also finds application in medicine as a coating for pills and capsules The crude gelatin, prepared by the simplest processes, is called *glue*.

Consult Davidowsky, *Practical Treatise on the Raw Materials and Fabrication of Glue, Gelatin*, etc, trans by Brannt (Philadelphia, 1884), Standage, *Cements, Pastes, Glues, and Gums* (London, 1893), Thorpe, *Dictionary of Applied Chemistry* (ib, 1912) See also ISINGLASS, GLUE

GELATIN, VEGETABLE See AGAR AGAR

GEL'ATIN PROCESS. Gelatin is used in many photographic and photomechanical processes as a vehicle for certain chemicals which

either alone or in combination are sensitive to the action of light and under its influence experience changes in their condition The substitution of the gelatin film of the dry plate for the collodion surface of the wet plate was an important development in photography, while the fact that gelatin mixed with bichromate of potash becomes insoluble when acted upon by light furnishes the basis for many photographic processes. See PHOTOGRAPHY and PHOTO-ENGRAVING for a description of the more important uses of gelatin in photography and photomechanical printing processes

GELCICH, gĕl'tsĭk, EUGEN (1854–) An Austrian naval expert and scientist, born at Cattaro, Dalmatia. He was director of naval schools at Lussinpiccolo and Triest and in 1902 became chief inspector of commercial and naval schools in Austria He wrote extensively on geographical and chronometric topics and magnetism, as well as studies on the discovery of America, such as *Geschichte der Uhrmacherkunst* (5th ed, 1887), *Estudios sobre el desenvolvimiento histórico de la navegación* (1889), *La scoperta d'América e Christoforo Colombo nella letteratura moderna* (1890), *Die Uhrmacherkunst und die Behandlung der Prazionsuhren* (1892), *Die astronomischen Bestimmungen der geographischen Koordinaten* (1904), *Weichs-Glon oesterreiche Schif-fahrts-Politik und unseres nautisches Bildungswesen* (1912).

GEL'DERLAND, or **GUELDERS** An eastern province of the Netherlands, bounded by the Zuyder Zee and the Province of Overyssel on the north, Westphalia and the Rhine Province on the east and southeast, north Brabant on the south, and south Holland and Utrecht on the west (Map Netherlands, D and E 2) Area, 1906 square miles The northern part is sandy except in the eastern corner The southern portion between the Rhine and the Meuse is low and marshy, but very fertile The province is watered by the Rhine, Meuse, Waal, Barkel, Schipbeek, and a few smaller rivers The chief occupations are agriculture and stock raising, and the products are exported, notably cereals, fruits, flax, tobacco, and horses The manufactures include brick, cotton goods, paper, leather, footwear, and beer The commerce is facilitated by a canal from Yssel to Zwolle Pop, 1912, 662,250 Capital, Arnhem (q v)

History. Gelderland was a part of the Holy Roman Empire and first appears in history clearly as the County of Gelre, under Otto of Nassau, about 1061 In the first half of the fourteenth century it was one of the foremost provinces in the Netherlands. In 1339 it became a duchy, but soon thereafter the house of Nassau died out, and after a long struggle Gelderland, in 1379, was united to Julich Continual wars about the succession devastated the country, and from 1472 to 1477 Charles the Bold of Burgundy held the duchy, his claims passing to his daughter Mary, wife of Maximilian of Austria The latter, however, was unable to conquer the country, and only in 1543 was Charles V able to incorporate the country with the rest of his Empire The larger portion, known as Lower Gelderland, shared the history of the rest of the Protestant Netherlands (See NETHERLANDS) Upper Gelderland remained with Spain, but was claimed by Frederick I of Prussia as Duke of Cleves and taken possession of during the War of the Spanish Succession (1701–13), and recognized as his in the Treaty of Utrecht, but he could retain only a portion of it permanently, the rest going to Austria as a part of the Spanish Netherlands Finally the Austrian portion fell to the independent Netherlands During the French Revolution Upper Gelderland was united for a time to France by the Peace of Basel (1795) and Lunéville (1801) In 1815, by the Peace of Vienna, most of it was given to the Netherlands and the rest (around Dusseldorf) to Prussia Consult Westerate, *Gelderland in den patriottentijd* (Utrecht, 1903)

GELDNER, gĕlt'nĕr, KARL FRIEDRICH (1853–) A German Orientalist He was born at Saalfeld, Saxe-Meiningen, and studied at the universities of Leipzig and Tubingen In 1887 he went to the University of Halle, and in 1890 to Berlin as professor associate of Indo-Iranian languages In 1907 he was elected to the chair of Indo-Iranian languages at Marburg His important publications are *Ueber die Metrik des jungeren Avesta* (1877), *Studien zum Avesta* (1882), *Der Yasht aus dem Zendavesta* (1884), *Vedische Studien*, with Pischel (3 parts, 1889–1901), "Die altpersische Litteratur" in *Die orientalischen Litteraturen* (1906), *Glossar zu den Rigveda* (1907), *Der Rigveda in Auswahl* (1907), *Zur Kosmogonie des Rigveda, mit besonderer Berucksichtigung des Liedes 10, 129* (1908), *Vedismus und Brahmanismus* (1911) He edited *Avesta the Sacred Books of the Parsis* (Stuttgart, 1886–95), *Grundriss der iranischen Philologie* (2 vols, 1896–1904), Eng. trans by Mackichan in *Avesta, Pahlavi, and Ancient Persian Studies in Honor of the Late Sanjana* (Bombay, 1904)

GÈLE, zhĕl, ALPHONSO VAN (1849–) A Belgian explorer of Africa, born in Brussels In 1882 he was sent to Africa and became administrator of the region near Stanley Falls Three years later he revisited the Congo and explored its branches, subsequently tracing the Ubangi to long 23° E, and proving (1889) that the Ubangi was the same as the river that Schweinfurth had called Welle

GELÉE, zhe-lā', CLAUDE (1600–82), generally called Claude Lorrain, from the country of his birth A French landscape painter, the most important and influential master of the so-called Classical school, also an etcher He was born in the village of Chamagne in Lorraine in 1600 His parents were of humble origin, and he was the third son of five children He became an orphan at 12 and in consequence sought work for his own support, which led him to Rome about the age of 16 His talent and enthusiasm for art were aroused when he saw landscapes by a Flemish painter, Godfrey Waels, then residing at Naples He made the journey on foot to Naples to discover the master of his choice and lived in the artist's family for two years, while he made special studies in architectural design and perspective On his return to Rome he sought employment in the studio of Agostino Tassi, a pupil of Paul Bril, another landscape painter from Flanders The subjects of Tassi's pictures were picturesque ruins, harbors crowded with fleets and throngs of men from all nations, which were reflected later in the works of Claude. In 1625 he visited Venice and several cities in Germany and France On his return to Rome, where he lived for the rest of his life, he formed an intimacy with the painter Joachim Sandrart, to whom we owe his biography, and to whom Claude owed the incentive to study directly from

nature He enjoyed the patronage of Pope Urban VIII, for whom he painted two pictures, now in the Louvre—the "Village Fête" and a "Seaport at Sunset" Pope Clement IX also conferred upon him many favors

Thirty years of residence in Rome, studying the ancient buildings, made it possible for Claude to give to his pictures a true setting for the semipagan tastes of the ruling class His popularity reached such a point that he found it difficult to supply the demand for pictures, and they brought such high prices that other artists plagiarized his style and name In order to prevent the sale of fraudulent copies, he designed the *Liber Veritatis*, a book of 200 sketches in pen and ink wash, which could be used to verify the original work It was reproduced in mezzotint by Earldom and published in two volumes in 1777, a third volume of 100 drawings was added in 1819 Three of the four paper books which composed the original are now in possession of the King of England He worked up to the last year of his life, dying at 82 years of age, on Nov 25, 1682 His character was without reproach, one of his chief traits was thoughtfulness for others His testament gave instructions that his body should be buried in the church of Santissima Trinità de' Monti The French government, in 1836, had the remains removed to the French church, San Luigi de' Francesi, near the Pantheon

Claude Lorrain was by far the most important and influential painter of classic landscape during the seventeenth century, if not of all time His influence affected the landscape of all European countries, especially that of England in the works of Richard Wilson in the eighteenth century and Turner in the nineteenth century The subjects of Claude's works are marines and landscapes, often with sylvan groves and classical architecture His technique is smooth, but expressed with great simplicity. His color is warm and rich in quality, often glowing with a yellow tone, producing brilliant effects of light reflected in the sky, clouds, and water One of the charms of his pictures is the unlimited space they present, always interpreted with poetic feeling

In 1630 he appeared as an etcher and engraver, on the 44 etchings ascribed to him there are at least 18 signatures, some in French and others in Italian The technique of his drawings is curious, combining lines and wash. The lines are used only to emphasize the shadows and to delineate the figures

Most of his paintings are in England, but he is also represented in all the important galleries of Europe In the National Gallery, London, are the "Embarkation of the Queen of Sheba," "Embarkation of St Ursula," a "Seaport," and others; in Madrid, the "Finding of Moses," "Embarkation of St Paula", in Munich, the "Expulsion of Hagar and Ishmael," "Hagar in the Desert", in the Louvre (Paris), the "Landing of Cleopatra at Tarsus," the "Village Dance," six marine views, and two landscapes, in the Hermitage, St Petersburg, the 'Meeting of Jacob and Rachel," the "Flight into Egypt," 'Apollo and Marsyas"

Bibliography. A contemporary account of Claude's life and art was written by his friend and fellow artist, Joachim Sandrart, *Teutsche Academie der edlen Bau, Bild- und Malereikunste* (Nuremberg, 1675–79) Consult also D'Argenville, *Abrégé de la vie des plus fameux peintres* (Paris, 1745), Cousin, *Du vrai, du beau, et du bien* (ib, 1853), and monographs by Sweetzer (Boston, 1878), Lady Dilke (London, 1884), Pattison, *Claude Lorrain, sa vie et ses œuvres* (Paris, 1884), Dullea, *Claude Gelée, le Lorrain* (London, 1887), Grahame, *Claude Lorrain, Painter and Etcher* (ib, 1895), Rouyer (Paris, n d), Rose, *Renaissance Masters and a Study of the Art of Claude Lorraine* (3d ed, New York, 1908) No satisfactory monograph on Claude Lorrain has as yet appeared

GELERT, Johannes Sophus (1852–). An American sculptor He was born at Nybel, Schleswick, Denmark (now Prussia), and came to the United States in 1887, becoming a citizen five years later His studies were made at the Royal Academy of Copenhagen and in Italy, where a Danish government scholarship took him He succeeded early in America and received many important commissions and honors Among his more important works are the "Haymarket Monument" in Chicago the statue of General Grant in Galena, Ill, "Hans Christian Andersen" and "Beethoven" in Chicago, "Denmark" (New York Custom House), and "Roman Civilization," four statues on the façade of the Brooklyn Institute Museum, "Gothic Art" and "Napoleon," St Louis Museum, the statue of Col J F Stevens, at Minneapolis, and the extensive decorations of the courthouse at Hackensack, N J.

GELIGNITE See Explosives

GELIMER, gĕl'ĭ-mẽr *or* jĕl'-, or **GILIMER,** gĭl'ĭ-mẽr *or* jĭl'- The last King of the Vandals in Africa He was a great-grandson of Genseric, the conqueror of Carthage, and founder of the Vandal Kingdom in Africa After deposing his cousin, Hilderic, about 530, and occupying the throne, he was defeated (after he had put Hilderic to death) in the battles of Carthage and Tricamarum (533) by the Byzantine army under Belisarius, and brought as a captive to Constantinople It is said that when he walked as a captive in the triumphal procession, he constantly repeated the words of Solomon "Vanity of vanities, all is vanity" He afterward retired to his domain in Galatia, which had been bestowed upon him by the Emperor Justinian

GELL, gĕl, Sir William (1777–1836) An English antiquary and traveler, the younger son of Philip Gell, of Hopton, Derbyshire He was educated at Jesus College, Cambridge, and for some time was a fellow of Emmanuel College in that university Save for a diplomatic mission to the Ionian Islands (1800) and his service of Caroline, Princess of Wales, mentioned below, he devoted his time principally to topographical and geographical studies and published in London the following works, which, though not marked by scholarship, contain much material of value *The Topography of Troy* (1804), *The Geography and Antiquities of Ithaca* (1807), *The Itinerary of Greece with a Commentary on Pausanias and Strabo* (1810) *The Itinerary of the Morea* (1817, new ed, 1827), *Pompeiana or, Observations upon the Topography, Edifices, and Ornaments of Pompeii*, in conjunction with J. P Gandy, an interesting and beautiful work (1817–19, Ser 2, 1832), *Narrative of a Journey in the Morea* (1823), *The Topography of Rome and its Vicinity* (1834, new ed by Bunbury, 1846), *Rome and its Environs* (map, 1834). In August, 1814, Caroline, Princess of Wales, consort of George IV, on her departure for the

Continent, appointed him as one of her chamberlains In that capacity he attended her in various parts of Italy, but, being attacked with the gout, was soon obliged to resign his situation In 1820 he was examined as a witness at the bar of the House of Lords during the proceedings against her after she became Queen and had returned to England he testified in her favor (See CAROLINE, AMELIA ELIZABETH) Subsequently he resided in Italy, principally at Naples, having a house also at Rome, where he occasionally took up his abode He died at Naples and was interred in the English burial ground of that city His original drawings of classical ruins, about 800 in number, were bequeathed to the British Museum, these are exact and detailed

GELLERT, gĕl'ĕrt, CHRISTIAN FURCHTEGOTT (1715–69) A noted German fabulist and professor, of unusual personal influence in his day He was born at Hainichen, Saxony, and studied theology at Leipzig, where he afterward passed most of his life as tutor, teacher, professor, and author. His didactic and religious poems, fables, plays, and novels were in their day immensely popular, as were his lectures on morals and literature. His *Works* (10 vols, 1769–74 and 1867) are types of the innocuous and rationalistic His *Fabeln und Erzahlungen* (1746) and the religious poems are still often republished separately His *Tagebuch* (1869) is the best available biography Consult also his *Life* by Doring (Greiz, 1833)

GEL'LIUS, AULUS A Latin author of the second century A D Little is known of his life He is supposed to have been born at Rome, where, at all events, he studied rhetoric Subsequently he proceeded to Athens to pursue the study of philosophy On his return to Rome he entered upon a legal career, without, however, abandoning his literary pursuits Gellius' well-known work, *The Attic Nights* (*Noctes Atticæ*), begun during the long nights of winter in a country house near Athens and completed during the latter years of his life, is a collection of miscellaneous matter on language, antiquities, history, and literature, in 20 books, of which the eighth is wanting. The work is destitute of any plan or arrangement, is disfigured by archaisms, and derives its value mainly from being a repository of curious knowledge, and by its preservation of many extracts from Greek and Latin works no longer extant The *editio princeps* appeared at Rome in 1469, the earliest critical edition is that of Gronovius (Leyden, 1706), the most important editions are those of Hertz (Berlin, 1883–85, *editio minor*, Leipzig, 1886), and Hosius (Leipzig, 1903 this book contains a good bibliography of writings on Gellius) There are editions of selections, with notes by Nall (London, 1888), and Knapp (New York, 1895) There is an English translation by Beloe (London, 1795). Consult the Introduction to the edition by Knapp, Sandys, *A History of Classical Scholarship*, vol i (2d ed, Cambridge, 1906), Nettleship, "The Noctes Atticæ of Aulus Gellius," in *Lectures and Essays* (Oxford, 1885), Knapp, "Archaism in Aulus Gellius," in *Classical Studies in Honour of Henry Drisler* (New York, 1894), Foster, *Studies in Archaism in Aulus Gellius* (ib., 1912)

GELNHAUSEN, gĕln-hou'zen. An ancient town in the Prussian Province of Hesse-Nassau (Map Germany, C 3), situated on the river Kinzig, 27 miles northeast of Frankfort It is surrounded by walls, and has the church of St Mary, built in Transition style in the thirteenth century with four towers (recently restored), the Rathaus, a building dating from the time of Frederick I and supposed to be a guild house, and a so-called Hexenturm (witches' tower) On a small islet in the Kinzig lie some well-preserved parts of an Imperial palace erected by Frederick Barbarossa in the twelfth century and destroyed by the Swedes in the Thirty Years' War The town has also a monument to Philip Reis, the alleged inventor of the telephone and a native of Gelnhausen The town once had the rank of an Imperial city and was the temporary residence of several emperors It has manufactures of rubber goods, electric lamps, shoes, chemicals, cigars, sealing wax, organs, and has a trade in wine, fruit, and sandstone. Pop, 1910, 4859

GE'LON (Lat, from Gk Γέλων). Tyrant of Gela and Syracuse He was the son of Dinomenes and a native of Gela His family was one of the oldest and most distinguished of that city Gelon first figures in history as general of horse in the army of Hippocrates, Tyrant of Gela On the death of the latter he contrived to obtain the supreme power, 491 B C, and about 485 B C made himself master of Syracuse also, to which he transferred the seat of his government, and which he rendered the first Greek city in Sicily All the inhabitants of Camarina, more than half of those of Gela, and many from other neighboring towns, he brought to Syracuse His influence soon extended itself over a great part of the island At the time of the invasion of Xerxes Gelon refused to come to the aid of the Greeks, ostensibly because they would not make him commander in chief He soon after came into collision with the Carthaginians, but defeated them in a decisive battle at Himera in 480 B C — on the same day, it is said, on which the battle of Salamis was fought He thereafter ruled in peace He is praised as a merciful and wise ruler, who was beloved by his people and hailed as their deliverer and sovereign After his death, about 478 B C, he was honored as a hero. His brother Hiero succeeded him

GELSE'MIUM (Neo-Lat, from It *gelsomino*, jasmine, from Ar. *yasmīn*, from Pers. *yāsmīn*, jasmine) A drug, consisting of the rhizome and rootlets of *Gelsemium sempervirens*, a climbing shrub of the natural order Loganiaceæ, having a milky juice, opposite lanceolate, shining leaves, and axillary clusters of from one to five large, funnel-shaped, very fragrant yellow flowers The fruit is composed of two separable jointed follicles, containing numerous flat-winged seeds. The stem often runs underground for a considerable distance The plant is a native of the United States, growing on rich clay soil by the side of streams near the coast, from Virginia to Florida and Texas Its principal constituents are two alkaloids, gelsemine and gelsemimine, a volatile oil, and gelsemimic acid The physiological action of the drug is to paralyze the motor centres, affecting successively the third, fifth, and sixth nerves Its fatal action is due to asphyxia from paralysis of the respiratory centre In large doses it produces alarming symptoms, which have terminated fatally These appear to vary in different cases, but the more prominent are pain in the forehead and in the eyeballs, giddiness, a feeling of muscular fatigue, slurred pronunciation, labored respira-

tion, ptosis, wide dilatation of the pupils, and impossibility of keeping an erect posture The mind in most cases remains clear until shortly before death The earliest and most prominent symptom of a fatal or dangerous dose is the drooping of the eyelids, which indicates the immediate administration of stimulants, for when the paralysis of the tongue, which ensues, extends to the epiglottis, deglutition becomes impossible, and, unless the sufferer be placed in a forward position, the epiglottis is apt to fall back and close the windpipe The antidotes which have been found most efficient are carbonate of ammonia, brandy, aromatic spirits of ammonia, and morphine Gelsemium is not much used in modern medicine on account of its dangerous qualities and uncertain effects, but it has proved valuable in some cases of malarial fever and is occasionally used as a cardiac depressant and in spasmodic affections and as a remedy for rheumatism and neuralgia

GELSENKIRCHEN, gĕl'zen-kĭrk'en A thriving industrial town on the Rhine-Herne Canal in the Prussian Province of Westphalia, 5 miles north of Essen It has extensive coal mines, large iron and steel works, rolling mills, soap factories, and flour and saw mills, manufactures boilers, glass, mirrors, soap, chemicals, safes, electric machinery, furniture, vehicles, bricks, leather; and carries on a trade in grain, wood, horses, and cattle Its rapid growth is due to the large coal deposits discovered in 1855 in the vicinity In 1910 5,600 000 tons of coal were mined It was made a city in 1875. In 1903 several adjacent localities were incorporated with it, and the growth of the town since has been rapid. Pop, 1852, 844, 1900, 36,935, 1910, 169,513. It is the headquarters for many German labor organizations, and has a museum of fire protection.

GELVES, hel'vās, Los. A small island in the Gulf of Cabes, Mediterranean It was the scene of a great battle between the Spaniards and the Turks in 1790 Combined land and naval forces of 13,000 Spaniards defended the island; but when the Turks attacked, the Spanish commanders deserted The fleet of 65 vessels and 5000 men was immediately captured, and of the 8000 soldiers who stoutly defended the shore from their trenches only 1000 were left at the end of an eight weeks' siege, and most of them were slaughtered It was a great blow, not only to Spain, but to all Christendom.

GEMARA, ge-ma'ra (Aram, complement). That portion of the two Talmuds, the Babylonian and the Palestinian, containing the annotations, discussions, and amplifications of the Mishna, or Talmudical law, by the schools of Babylon and Palestine The Babylonian Gemara is far more complete than the Palestinian, as well as more lucid, and is a more highly valued authority It was not completed till about 600 A D The Palestinian Gemara was completed c 375 A D. See MISHNA, TALMUD

GEMATRIA. A Hebrew word, derived in a transliteral way from the Greek γεωμετρία, *geometria*, geometry, and describing a system, of uncertain antiquity, by which the Scriptures were given mystic interpretation Its process was to substitute for or find in a word another, the numerical value of whose letters totaled the same sum

GEMBLOURS, SIGEBERT OF. See SIGEBERT OF GEMBLOURS.

GEMBLOUX, zhaN'blōō'. A town of the Belgian Province of Namur, 24 miles southeast of Brussels (Map Belgium, C 4) It is noted for its Benedictine abbey, founded in the tenth century and now occupied by the Royal Agricultural College It has large railway and engine works Gembloux was the scene of the defeat of the Dutch by the Spanish under Don John of Austria in 1578 Pop, 1910, 4759

GEM'INI (Lat, twins) The third constellation of the zodiac, containing the two bright stars Castor and Pollux, its sign is II It contains a couple of interesting spectroscopic binaries, ζ and η Geminorum, the former has a period of 10 days, 4 hours, while the latter is a long-period variable of the Mira class and runs through its phases in 229 days Two *novæ* have appeared in this constellation the first was discovered by Turner as a star of the seventh magnitude at Oxford in 1903, and the second—of the fourth magnitude—by Enebo at Domaas, Norway, in 1912, they are now, according to Barnard, of the sixteenth and eighth magnitudes respectively

GEMINIANI, FRANCESCO (1667–1762) A famous Italian violinist and composer, born in Lucca He was a pupil of Lunati and Corelli (q v) In 1714 he went to London, where, through his sensational success as soloist and teacher, he exerted a lasting influence upon the art of violin playing. In 1749–55 he lived in Paris, after which time he returned to London His original compositions consist of 12 violin sonatas and 12 concerti grossi However, his most important work is *The Art of Playing on the Violin*, written in English and published in London in 1751 It is the first instruction book for the violin ever compiled, and in it the principles laid down by Corelli are fully explained

GEMI'NUS (Lat., from Gk Γεμῖνος). A Greek writer, probably of the first half of the first century B C His birthplace is unknown, although Rhodes is often given It is equally uncertain where he lived, the claim on behalf of Rome being insufficiently established Of his works only one is extant, the *Introduction to Phenomena*, an astronomical work, published with Latin translation by Hilderic (Altorf, 1590), by Petau, in his *Uranologian* (Paris, 1630), and with a French translation by Halma, in his *Chronologie de Ptolémée* (Paris, 1819) Of his best works, the *Arrangement of Mathematics*, comprising at least six books, was the most important Fragments of this work have been preserved by Pappus, Eutocius, and especially by Proclus, and form one of the chief sources for the study of the early mathematical history of the Greeks

GEMIS'TUS (Lat, from Gk Γεμιστός), GEORGE, called GEORGIUS PLETHON, and more commonly GEMISTUS PLETHON. A Byzantine philosopher. The exact dates of his birth and death are uncertain, but he is known to have lived between 1350 and 1450 He was probably born at Constantinople, and the greater part of his life was passed in the Peloponnesus, where he probably died, almost a centenarian He was one of the deputies sent by the Greek church to the council which was held at Ferrara and Florence in 1438–39, for the purpose of arranging a union between the Latin and Greek churches Gemistus was more celebrated as a philosopher than as a theologian In his time the Aristotelian philosophy reigned supreme, but it had degenerated into a mere science of

words, from the study of which Gemistus turned away disgusted and applied himself to Plato Plato's philosophy so charmed him that thenceforward he devoted himself to its propagation, and in furtherance of this view, when in Italy, induced Cosmo de' Medici to embrace it Cosmo's example was followed by others in Florence, and thus a Platonic school was founded in the West which flourished for nearly 100 years afterward. During the latter part of his life Gemistus was engaged in bitter conflicts with the most eminent of the Aristotelians, among whom George of Trebizond held a high position, and the discussion was carried on with unseemly violence Consult Schultze, *Geschichte der Philosophie der Renaissance*, vol i (Jena, 1874), Fabricius, *Bibliotheca Græca*, vols viii, xii (12 vols, Hamburg, 1790–1809), Symonds, *The Renaissance in Italy*, vol ii (new ed, New York, 1897–98) For his own writings consult Migne, *Patrologia Græca*, vol cix (161 vols, Paris, 1854–66).

GEMMÆ, jĕm'mē (Lat, buds). Peculiar vegetative reproductive bodies which are formed upon the thallus of certain liverworts See HEPATICÆ

GEMMELLARO, jĕm'mĕl-la'rō, GAETANO GIORGIO (1836–1904). A Sicilian naturalist, born at Catania He was educated in that city and in Naples and subsequently became professor and rector at the University of Palermo. His researches in archæology and volcanology are valuable, and the Monte Gemmellaro, a volcanic formation caused by the eruption of Mount Etna in 1886, was named after him His works include *Descrizione di alcune specie di minerali dei vulcani estinti di Patagonia* (1854–56), *Pesci fossili della Sicilia* (1858); *Studi paleontologici sulla fauna del calcare a Terebratula janitor* (3 vols, 1868–76); *La fauna dei calcari* (1887–99), *I crostacei dei calcari* (1890), *I celalopodi del Frias superiore della regione occidentale della Sicilia* (1904)

GEMMI (gĕm'mē) **PASS.** A mountain pass across the Alps in Switzerland, at an altitude of 7640 feet, and connecting the cantons of Bern and Valais It contains a very dangerous mule path along which travelers are now not allowed to ride

GEMMULE, jĕm'ūl (from Lat *gemmula*, little bud, dim of *gemma*, bud) In biology, (1) a mass of cells cut off from the parent for reproduction, (2) a hypothetical self-multiplying particle upon which inheritance depends

(1) Among animals, gemmules are found in the groups of sponges and Polyzoa In sponges, as winter approaches, numbers of the migratory cells form an aggregation in which two layers are eventually distinguishable The central cells are loaded with yolk, the cells of the outer layer become club-shaped and arrange themselves in a sort of high epithelium This layer of cells secretes a cuticular membrane around the inner mass of cells and forms a layer of dumbbell-shaped spicules close set in a radial fashion The central cells are those from which the embryo is to arise next spring The outer layer is protective The gemmules thus constituted are set free when winter kills the sponge tissue. Next spring the inner cells grow and the bonds of the outer layer are broken. Such gemmules are found chiefly in fresh-water sponges, but within the last decade they have been found in marine sponges also In the fresh-water Polyzoa the gemmules are of somewhat different character and are called statoblasts The statoblast arises in a special threadlike organ, the funiculus, that is composed of ectoderm within and of mesoderm without The ectodermal core proliferates to form a hollow square, which later flattens and eventually produces the tough cuticula by which the statoblast is covered The outer mesodermal layer thickens, stores food material, and becomes enveloped by the ectoderm In addition to the cuticula, which the ectodermal layer secretes, the statoblast is often provided with spines and a float which permits the statoblast to swim In the spring the embryo develops within the brown cuticula, bursts open this shell, and emerges to lay the foundations of a new colony Both of the foregoing gemmules are devices for enabling the species to outlast the winter

(2) The hypothetical material basis of inheritance called *gemmule* by Darwin has been recognized by one name or another by almost every philosophic writer in biology, other nearly or quite synoymous terms are the physiological units of Spencer, the bioblast of Beale, the pangene of De Vries, the plasome of Wiesner, the micella of Nageli, the plastidule of Haeckel and Elssberg, the biophore of Weismann, somacule of Foster, idioblast of Hertweg, idiosome of Whitman, biogen of Verworn, and gemmule of Haacke The hypothesis has arisen on account of the necessity of assuming a structure to protoplasm intermediate between the visible foamwork and granules and the invisible molecules The line of argument is briefly this The qualities of the adult are inherent in the egg and also in each of the cleavage spheres, each quality is represented by material particles, which divide when the cell divides, the particles are not molecules, for it is hardly conceivable that a molecule stands for a somatic quality, therefore there must be some sort of unit groups of interacting and internally associated molecules Darwin's hypothesis (see PANGENESIS) was that each cell threw off one or more gemmules, they floated in the blood to the germ cells and became lodged in these cells Galton tested this theory by transplanting the blood of one species of hare into a second The progeny of the second was not influenced by the blood of the first species Weismann believed in no such migration of gemmules The gemmules of the germ cells receive no influx of gemmules from outside by which their characters might be changed, on the contrary, the composition of the germ cells is unchanged, says Weismann, except as a result of crossing or internal spontaneous modifications See EMBRYOLOGY

GEMOT, ge-mōt' (AS *gemōt*, assembly) Among the Anglo-Saxons, a public assembly of freemen or men of noble rank for the purpose of legislative or judicial action, but *gemot*, or *moot*, is also used for any formal meeting Besides the great council of the nation, the witenagemot (q v), there were among the Anglo-Saxons various minor motes, or moots, which were local bodies dealing with local affairs. There was a *shire-gemot*, or county court, which met usually twice a year; a *burg-gemot*, and a *hundred-gemot* (see HUNDRED) which met every month, and a *halle-gemote*, or lord's court These institutions are regarded as being derived from the old Teutonic assemblies where every freeman had a voice, and where a clashing of arms betokened the approval, and a groan the rejection, of a plan

GEMS (from Lat *gemma*) Precious or beautiful stones, especially those cut or engraved for use as jewels or seals The art of engraving gems at the earliest period of the Egyptian monarchy was comparatively unknown, although beads and vases were cut out of many varieties of stone About the beginning of the fourth dynasty scarabs (see SCARABÆUS) of obsidian or crystal began to take the place of the wooden cylindrical intaglios previously used as seals, of which a few examples have been found at Abydos and Nagada Beginning with the eighteenth dynasty, scarabs are counted by thousands While the beetle forms are usually naturalistic, the flat underside affords a splendid surface for hieroglyphic engraving Historically the scarab is of especial importance, because adopted and improved by the Phœnicians, the Greeks, and the Etruscans However, other forms were numerous in Egypt An oblong of green jasper in the Louvre shows on one side Thothmes II (1800 B C) killing a lion, and on the other in his war chariot drawing his bow A square signet of yellow jasper is in the British Museum engraved with the name, titles, and horse of Amenophis II (about 1450 B C) Figurines of deities and animals were carved out of amethysts, emeralds, agates, sardonyx, carnelian, obsidian, hæmatite, lapis lazuli, etc There are in museums numerous cats, lions, crocodiles, eagles, frogs hippopotami, and other symbols Under the Ptolemies and Romans the Gnostic gems, called abraxas, generally of lapis lazuli, bloodstone, and jasper, begin to appear, but these are made by the same process as the Greek, from which they were derived The earliest engraved gems are Babylonian, always until a late period in the form of cylinders from 1 to 2 inches long and about ½ or ¾ of an inch thick, pierced through their long axis for a cord or pin, and used for impressing the sign manual by rolling on soft clay. Their universal use multiplied them to such an extent that they form our main source of information as to the periods and themes of Babylonian sculpture, the favorite theme was the figures of the patron god and goddess being worshiped by the owners of the gem, and the figures are arranged in a single friezelike row There are also many scenes purely mythological, such as the legends of Gilgamesh, the Babylonian Hercules, of Merodach, of Samas, of Raman, and other deities The seals of the ancient kings Sargani (c 3850 B C), Naramsin (c 3800), and Ur-gur (c 2800 B C), of Gilgamesh breaking the lion's back, of the captives of Erech, are treated in a conventional style that indicates long traditions. These Babylonian traditions, together with the cylinder seal, were adopted by the Assyrians, but with less use of the nude and a narrower range of themes Also the outlines are sharper and the details cleaner It was the Assyrian style which most influenced the gem cutting of Persia, the seal of Darius, with the King in his war chariot, is only a puny copy of the corresponding spirited Assyrian scenes In late Assyrian times the rolling cylinder was partly replaced by the conical signet with figures cut on the base Meanwhile all the Orient had copied Babylonian models The Phœnicians, Hittites, Syrians, and other races used cylinders of similar style. A cruder style, with animals and heads, came into vogue under the Parthians, often accompanied with Pahlavi inscriptions Among the Jews the use of signets (see RING) was common, and the breastplate of the high priest consisted of 12 cylindrical stones of different colors—sard, topaz, emerald, carbuncle, sapphire, jasper, jacinth, agate, amethyst, chrysolite, beryl, onyx —each engraved with the name of one of the 12 tribes, but no Hebrew engraved stones earlier than the fifth or sixth century B C are known The earliest Greek engraved gems are those revealed by the recent excavations in Crete These are triangular prisms with hieroglyphs, dating from before 3000 B C and made of the native soft steatite, which later was superseded by the harder carnelian and chalcedony About 2000 B C the picture signs began to be superseded by script, and simultaneously the engravers acquired great skill in rendering animal forms The Cretans used engraved gems not only as seals but also for inlaying, and in the palace at Cnossus was found a lapidary's shop with unfinished pieces of marble, steatite, jasper, and beryl Also prehistoric, and closely resembling the Cretan gems, are those unearthed by Dr Schliemann at Mycenæ, where a lapidary's shop like the one at Cnossus has since been found While there is no mention of seals in the *Iliad* or the *Odyssey*, Solon about 600 B C had a law forbidding engravers to retain the impressions of seals made by them Mnesarchus, the father of Pythagoras, who lived about the same time, was an engraver of gems Theodorus of Samos about 540 B C made for Polycrates the famous ring with engraved emerald that he tried to lose by throwing into the sea (Herodotus, iii, 41) At the period of the Persian wars signet rings were in common use, and later the writings of the Platonists and Stoics constantly allude to gems The flute player Ismenias (437 B C) purchased an emerald engraved with the figure of Amymone One of the Ptolemies presented as a most precious gift his portrait engraved on an emerald to Lucullus, and Cleopatra had a gem with Bacchus

Although the principal varieties of decorative stones were known to the Greeks and Romans, yet, owing to the absence of scientific and chemical analysis, they appear to have distinguished them only by color, specific gravity, and density The nomenclature, too, has caused confusion, so that it is impossible to identify all the stones mentioned by Theophrastus and Pliny. The ancients seldom engraved diamonds, rubies, or sapphires, being content with stones of less hardness and value The principal stones they used were (1) the *carnelian* and its more transparent variety the *sard*, in common use in the days of Plato (so called from Sardis in Lydia, but chiefly obtained from India and Babylonia), (2) the *chalcedony*, used for seals and reliefs, (3) the *onyx*, or nail stone, variously described by Pliny and his predecessors, but distinguished by a white layer resembling the nail, (4) the *niccolo*, or *Ægyptilla*, obtained from the onyx, a blue spot with a black zone encircling it, (5) the *sardonyx*, which was a variety of the onyx, having black, blue, white, and red colors, and particularly used for cameos and vases, by cutting down the lighter-colored layers to the darkest for a background to the figures, (6) the *agate*, or *achates*, so named from a Sicilian river, embracing many varieties, as the jaspachates, dendryachates, but confounded with the jasper, considered a charm against scorpions and spiders, used for whetstones, and as a talisman by athletes, and obtained from Egypt,

Greece, and Asia, (7) *plasma*, or the *prasius*, root of emerald, its varieties were the *molochates* and *nilion*, (8) numerous varieties of the *jasper*, green, blood red, yellow, black, mottled or porcelain, and even blue, were employed for signets at the Roman period, and procured from India, Persia, and Cappadocia, (9) *garnets*, the *granatici*, or red hyacinths of antiquity, principally in use in the latter days of the Roman Empire, (10) the *carbunculus*, supposed by some to be the name given by the ancients to the ruby, brought from India, Caramantis, Carchedon, and Anthemusia, (11) the *hyacinthus*, or *jacinth*, a yellow variety of the garnet, used for signets, and imported from Ethiopia and Arabia, (12) the *lyncurium*, or *lychnis*, the ancient name of the true modern jacinth, (13) several varieties of the *emerald*, or *smaragdus*, as the Bactrian or Scythian, supposed to be a green ruby, principally derived from the emerald mines at Zabora in the neighborhood of Coptos, (14) the *beryl*, obtained from India, cut in shape of a hexagonal pyramid, used at an early period and for engraving, (15) the *amethyst*, brought from Arabia Petræa and Armenia Minor, used for intaglios at all periods, (16) the *sapphirus*, supposed by some to be *lapis lazuli*, brought from Media and in use among the Egyptians and Persians, (17) the *anthrax*, supposed to be the ruby, (18) the *topaz*, a name applied by the ancients to a green stone found by the Troglodytes in the island of Cytis in the Red Sea, and first sent by Philemon to Berenice, out of which a statue of Arsinoe was made and placed in the so-called "golden temple" by Ptolemy Philadelphus, (19) the *chrysolithus*, (20) *chrysoprase*, (21) the *magnes*, or *lodestone*, used for cylinders and gems of a late period, (22) the green *tourmaline*, or *avanturine*, (23) the *obsidian*, four elephants made of which were dedicated by Augustus in the Temple of Concord, besides which we read of a statue of Menelaus, made of the same material, returned to the Heliopolitans by Tiberius; (24) the *opal opalites*, obtained from India, the largest of which then known was of the size of a hazelnut, (25) the *adamas*, of which seven varieties were known to the ancients, used only for cutting other gems, or worn rough, but not engraved, or even faced Other stones in Pliny's list had fanciful names, as (26) the *aromatites* of Arabia and Egypt, so called from its fragrance, (27) the *alectorius*, worn by the wrestler Milo, so called from being taken out of the gizzard of a fowl, (28) the *aspilates*, a fiery stone, said by Democritus to be found in the nest of the Arabian birds In the selection of stones for engraving the gem engravers adapted the material to the subject Bacchanalian subjects were often engraved on amethysts, marine, on beryls, martial, on carnelian, sards, and red jaspers; rural, on green jasper, celestial, on chalcedonies Virtues were also superstitiously attributed to the different varieties of gems Thus, the amethyst was supposed to be a protection against the influence of wine, and Hercules engraved on a Median stone, against colic

Among Etruscan products were scarabs entirely carved out of sard, carnelian, and agate, with engravings often of exquisite work, but generally harsh, and sometimes of severe style, with subjects derived from the earliest Hellenic myths, and occasional inscriptions in the Etruscan language, the names of the personages represented, seldom more than one figure appearing on the gem The subject is surrounded with a guilloche, or engrailed border, and the scarabs were pierced through their long axis, to set as rings or to wear as other objects of attire The contents of Etruscan tombs show how the numerous imported gems, both Oriental and Greek, furnished the models to native artists The Romans of the later Republic collected and copied Etruscan and Greek engraved gems, largely set as rings The device of Scipio Africanus was a head of Syphax, that of Sulla, the submission of Jugurtha, of Pompey, a lion carrying a sword, and of Cæsar, Venus armed with a dart Scaurus, the stepson of Sulla, had a collection of gems, *dactyliotheca* Pompey sent the collection of Mithridates as an offering to the Capitol, Cæsar, to outvie his great competitor, presented six such collections to the shrine of Venus Genetrix, and Marcellus, another to the cella of the Palatine Apollo At the commencement of the Empire the portraits follow the costume and art of the period, the hair is expressed by broad strokes, the compositions rarely contain more than two figures Artists of great merit were Dioscorides, Apollonides, and Chronius

After the Antonines the art rapidly declined, and portraits after Severus are rare, although even that of Mauricius is said to occur At the middle period of the Empire the work is exceedingly rude, often merely scratched out by a diamond point in carnelians, jaspers, and garnets The gems of this latter period are sometimes square, generally, however, the long or convex oval During the Empire, cameos (see CAMEO), or gems engraved in relief, the ancient *ectypa sculptura*, were much in vogue The smaller ones were used for rings, the larger, which are often perforated, are supposed to have been often attached to the dress as *phaleræ* They were worked out with the diamond point The first great cameos are those of the Ptolemies, such as the great Naples cameo of Zeus by Sosus, that of Ptolemy and Arsinoe in the Hermitage of St Petersburg, the onyx cap of Ptolemy at the Cabinet des Médailles in Paris, the famous Farnese cup, the vase of St Martin d'Agaune—all masterpieces and serving as models for the artists of the Augustan age. To the early Roman Empire belong some superb pieces, such as the "Triumph of Augustus," a sardonyx in the Vienna collection, and the so-called "Apotheosis of Augustus" in the Bibliothèque Nationale in Paris, also a sardonyx The composition in these Roman works is elaborate, and the figures numerous and sometimes in several rows On the Vienna sardonyx Jupiter, Augustus, and Roma are enthroned above, in the middle row are Earth, Ocean, Abundance, Germanicus, Victory, and a triumphal chariot, while below are German and other captives The cameo at St Petersburg is 1 foot long, and that in the Marlborough collection, with the heads of Didius, Julianus, and Mantio Scantilla, is 8½ inches long by 6 inches high Still larger carvings are in the form of vases, cups, boxes

The subject matter of classic gems embraces the whole circle of ancient art and follows the laws of its development, animal forms being succeeded by those of deities and subjects derived from the battles of Greeks and Amazons and centaurs, the exploits of Hercules and other heroes; then by scenes from tragedians and later

myths, and finally by portraits, historical representations, and allegories The inscriptions consist of the names of artists (often forgeries), sometimes in the genitive case, but often accompanied with the verb ἐποίει, made, addresses to individuals, gnomic or other sayings, indicating that the gems are amulets against demons, thieves, and various evils, or charms for procuring love, the names of the possessors, and sometimes addresses, occasionally even distichs of poetry, and various mottoes These inscriptions were often added by subsequent possessors and are not of the age of the gem itself

The chief implement used by the ancient engravers (see LAPIDARY'S WORK) appears to have been made by splitting diamonds into splints with a heavy hammer and then fixing these points like glaziers' diamonds into iron instruments, with which the work was executed by hand The drill was often used for hollowing out the deeper and larger parts of the work, before the diamond point was brought into operation, and emery powder was used for polishing The wheel, a minute disk of copper, secured to the end of a spindle, and moistened with olive oil, emery powder, or diamond dust, and driven by a lathe, does not appear to have come into use till the Byzantine epoch It has been conjectured that the artist used lenses of some kind, or globes filled with water, to execute his minute work, but the ancient, like the modern engraver, rather felt than saw his way A more primitive method was that in which nothing but a copper tool was used, moistened as described A still more primitive technique is that of many rude, early, or provincial Babylonian cylinders, where the drill is the only instrument, and the forms are indicated either by larger or smaller hollows connected usually by straight lines

The decadence in sculpture was very quickly felt in gem cutting, which produced little, and that of hardly any value, after the second century A D Even the small skill shown in Gnostic and early Christian examples was lost, and the Merovingian and Carolingian monarchs, except in the case of monograms engraved on signet rings, were obliged to use antique gems, instead of those engraved by the artists of their day Rock crystals, however, were employed in a Byzantine style of art, with sacred subjects, in the ninth century, and a few other examples have been preserved in the treasury of St. Mark's at Venice, and in Paris (Bibliothèque Nationale). The art was all but lost in the West, except for a few pieces such as the Gothic rings of the Guerrazar treasury, the seal of Lothair at Aix-la-Chapelle, and the crucifix of Conques It was revived during the pontificate of the Venetian, Paul II, himself a collector, by Lorenzo de' Medici (1449–92), who had Giovanni delle Corniole, at Florence, and Domenico dei Camei, at Milan, work under his patronage A subsequent school of gem engravers originated with Pietro Maria da Pescia, who worked for Leo X, the chief representatives of the school are Michelino, Matteo de' Benedetti, the celebrated painters Francia, M A Moretti, Caradossa of Milan, Leonardo da Vinci, J Tagliacarne, Giovanni Bernardi of Castel Bolognese, celebrated for a Tityus copied from Michelangelo These were succeeded by Matteo del Nassaro of Verona, who worked for Francis I and produced a crucifixion on heliotrope, so that the red spots seemed drops of blood issuing from the wounds of Christ, Caraglio, who flourished in Poland about 1570, Velerio dei Belli, who chiefly employed rock crystal, Marmita, Domenico di Polo, Nanni, Anichini of Ferrara, and Alessandro Cesati, celebrated for a cameo head of Phocian, Dei Rossi, a Milanese, who engraved the largest cameo of modern times, Giacomo da Trezzo, celebrated for its portraits, who is said to have been the first to engrave on the diamond (in 1564)—an honor disputed, however, by Birago, another Milanese, who made a portrait of Don Carlos and the arms of Spain on this gem

The art, which had declined at the close of the sixteenth century in Italy, flourished in the seventeenth century in Germany under Rudolph II, for whom Lehmann engraved at Vienna, and in France, where Coldoré worked for Henry IV and Louis XIII In the seventeenth century Sirletti, who died at Rome in 1737, excelled in portraits and copied antique statues with great excellence The two Costanzi were celebrated about 1790, one for the head of Nero on a diamond Rega of Naples is said to have come nearest to the antique Natter of Nuremberg, who died in 1763, is celebrated for his intaglios, Guay and Barier were celebrated in the French school, and the English produced Reisen, who died in 1725, Claus, who died in 1739, Smart, celebrated for the rapidity of his works, and his pupil Seaton, a Scotchman, who engraved portraits of the great men of his day The greatest artist of the age, however, was Natter Of the subsequent Italian school, Ghinghi, Girometti, Cerbara, Bernini, and Putentati are much praised The nineteenth century produced Marchant, Burch, Wray, and Tassie, while Pistrucci, celebrated for his charming cameos, Weigall, and Saulini, who made intaglios, complete the list.

With respect to ancient gems in the Middle Ages they were preserved in magnificent bookbindings—especially of manuscripts of the Bible—in reliquaries, ciboriums, shrines, chasses, and other ecclesiastical vessels, in which they were set The collections of St Mark's, Venice, of Aix-la-Chapelle and other churches, the Bibliothèque Nationale at Paris, the cabinets of the museums of Florence, Vienna, St Petersburg, etc, show how this was done by Byzantine, Carolingian, Romanesque, and Gothic artists The collecting of antique gems for their own sake, as examples of ancient art, commenced with Lorenzo de' Medici, who formed the Florentine collection and had his name incised on his gems The large cameos of the European collections, however, appear to have been brought by the Crusaders from the East The French collection dates from Charles IX and was augmented by the successive kings of France, it is very rich in gems of all kinds, that of Berlin, containing the united cabinets of the Elector of Brandenburg and the Margrave of Anspach, collected by Stosch, consists of nearly 5000 stones The Vienna collection, far less numerous, is remarkable for its large cameos In England the collection of the British Museum, collected originally by Townley, Hamilton, Payne-Knight, and Cracherode, consists of about 1500 stones, some of great beauty and merit, but is very poor in cameos The private collection of the Duke of Devonshire, formed in the last half century, comprised upward of 500 intaglios and cameos, including some of the finest known. The Pulzky collection contains many rare and choice

intaglios A celebrated collection, the Poniatowski, formed upon the basis of the old collection of Stanislas, last King of Poland, was so filled with forgeries by its last possessor, executed by Roman artists, with inscriptions by Diez, that it entirely lost its value on dispersion The Hertz collection was remarkably rich in fine Etruscan scarabæi and other intaglios The Tyszkiewicz collection enriched the Boston Museum with many fine pieces The Morgan collection, in the American Museum of Natural History, New York, begun in 1899 and added to since, is one of the largest There are in existence probably about 10,000 gems reputed to be antique Yet these are only a small portion of those formerly existing During the Renaissance numerous and successful imitations (see GEMS, IMITATION) of antique gems were made and the signatures of Greek and Roman artists were manufactured Such forgeries are still frequent

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GEMS, IMITATION AND ARTIFICIAL The high appreciation in which gems were held by the ancients naturally led to the manufacture of imitations, and as early as the time of Pliny imitation opals and emeralds were well known. Seneca mentions that Democritus invented a process for making imitation emeralds by giving a green color to rock crystal According to Thomas Aquinas, emerald, hyacinth, ruby, sapphire, and topaz were made in the twelfth century The "Sacro Catino" of the cathedral of Genoa, and the celebrated table of Solomon taken by Vespasian from the temple at Jerusalem, are known to have been imitations The powder of crystal was largely used in the manufacture of imitation gems among the Romans, with the result that thousands of spurious gems accurately imitating the sapphire and the ruby were passed upon the uninitiated, indeed, modern examination shows that many of the famous gems of antiquity were made simply of glass

Imitation Gems Imitation gems may be divided into two groups, imitation and counterfeit The first includes mineral substitutes and doublets and triplets, the second, gems made from natural substances by chemical means The first class includes quartz, white Brazilian topaz, and the colorless varieties of beryl, emerald, sapphire, and zircon, which have been sold as diamonds Colored varieties of quartz are frequently substituted for other gems, thus, the yellow varieties, as cairngorm and citrine, are sold as topaz, and the purple varieties of quartz as the Oriental amethyst The application of heat to certain gems, such as topaz and sapphire, frequently renders them colorless and increases their brilliancy, in consequence of which they are cut and sold as imitation diamonds Doublets and triplets are thin plates of a genuine gem attached to a valueless backing by means of a thin layer of gum mastic Those imitation gems that are made by chemical processes are generally a special variety of glass known as *paste*, or *strass*, which consists of pure powdered quartz (preferably rock crystal) 38–59 parts, red lead 28–53 parts, and dry potassium carbonate 8–14 parts These proportions admit of considerable variation, and arsenious oxide, borax, potassium nitrate, aluminium oxide, and calcium carbonate are frequently added The ingredients are powdered separately, carefully mixed, and heated in a sand crucible The heat is gradually raised to fusion and is maintained and carefully regulated at that temperature for about 30 hours, after which it is gradually lowered The value of the product depends chiefly on the regularity of the temperature, the intimacy of the previous admixture, and the slowness of cooling, and is much increased by prolonged fusion

This glass forms the basis of nearly all of the imitation gems, and the imitation diamonds are cut directly from it The required tint for the colored gems is imparted by the solution in the paste of certain metallic oxides and other substances, as is shown in the following formulas *amethyst*, paste 1000 parts, glass of antimony 8 parts, cobalt oxide 5 parts, purple of Cassius 0 2 part, *beryl*, paste 1000 parts, glass of antimony 7 parts, and cobalt oxide 0.4 part, *carbuncle*, paste 1000 parts, glass of antimony 500 parts, purple of Cassius 4 parts, and manganese dioxide 4 parts, *emerald*, paste 1000 parts, copper oxide 8 parts, and chromium oxide 0 2 part, *garnet*, paste 1000 parts, with variable proportions of purple of Cassius, *ruby*, paste 1000 parts, glass of antimony 40 parts, purple of Cassius 1 part, and gold 1 part, *sapphire*, paste 1000 parts, cobalt oxide 14–25 parts, *topaz*, paste 1000 parts, glass of antimony 40 parts, and purple of Cassius 1 part The temperature at which these mixtures are fused, and the time occupied in fusion, naturally affect the product, and the proportion of the colorless ingredients also varies considerably The manufacture of these imitation gems is an important industry in Switzerland and in various parts of France and Germany Agate, carnelian, chalcedony, and onyx, for making jewelry and for engraving, have been artificially stained at Oberstein and elsewhere in Germany. The stone is soaked in oil or other organic liquid and

then boiled in strong sulphuric acid The organic matter absorbed by the stone is thus carbonized, and a black color is produced A red color may be obtained by soaking the stone in a solution of ferrous sulphate, and a deep blue color results by afterward soaking in a solution of potassium ferricyanide

The manufacture of imitation pearls is an important industry The pearls are made by coating the inner surfaces of glass beads with a preparation made from the scales of certain fishes This extract is prepared as follows Several pounds of scales are washed in fresh water to remove dirt, and they are then churned for several hours in cold fresh water, and the mass subjected to pressure in a linen bag The silvery, lustrous runnings are caught and set aside, and the operation repeated until the scales have lost their silvery appearance The runnings, to which a little ammonia has been added, are put aside to clarify, care being taken to prevent putrefaction The sediment is washed repeatedly with fresh water and left to settle, when the washings are quite clear, the lustrous sediment is bottled with its own volume of alcohol, shaken, and allowed to settle The alcohol is then decanted off, and the operation repeated until the sediment has lost its water and is of the consistency of butter For use, the preparation is mixed in small quantities with a hot aqueous solution of gelatin, to which a small quantity of alcohol has been added In the manufacture of colored pearls the desired shade is obtained by the addition of some suitable coal tar dyestuff

Artificial Gems As early as 1837 Gaudin obtained rubies by fusing alum in a carbon crucible at a high temperature, a small quantity of chromic oxide was used to give the red color In 1847 Ebelman made the same experiment, using boracic acid as a flux Sainte-Claire Deville and Caron, in 1858, described various processes by which they obtained small crystals of white and green corundum, rubies, sapphires, etc Frémy and Feil, in 1877, were able to produce crystals that possessed the form of natural rubies and easily scratched topaz. Their process involved the fusion of lead oxide and pure alumina in a clay crucible, holding the mass in fusion until the silica of the clay united with the lead, leaving the alumina in crystallized masses In 1888 Frémy and Verneuil announced their successful preparation of artificial rubies by heating to redness a mixture of barium fluoride and alumina containing a trace of potassium bichromate In 1902–04 Verneuil described a new and eminently successful method of preparing gem rubies of large size and fine quality The process makes use of a vertical oxyhydrogen blowpipe whose oxygen tube contains a fine screen through which finely divided pure alumina mixed with 2½ per cent of chromium oxide can be passed Under the orifice of the blowpipe is a small rod of fused alumina on which the flame impinges Using coal gas, the flame temperature is maintained at 1800° F. to 2000° F with reducing action. The small particles of oxides falling through the flame melt and build up a pear-shaped mass on the lower support, which must be lowered as the mass increases The rate of formation is 12 carats per hour, and the limit of size 80 carats The annual output of the Paris factory is 5,000,000 carats, at an average cost uncut of 25 cents per carat.

Artificial Diamonds J B Hannay (1880) and R S Marsden (1881) announced the production of artificial diamonds, subsequent tests proved their product to be carborundum Later H Moissan, by means of the electric furnace and the ingenious introduction of iron as a matrix, produced genuine diamonds of minute size Moissan's process is briefly as follows Pure iron is melted with excess of pure carbon prepared from sugar in the electric furnace, employing a temperature of 4000° C and using 700 amperes of current at 40 volts The hot carbon crucible containing the molten mass is suddenly plunged in cold water and cooled below red heat Under these conditions the cooling of the exterior exerts great pressure on the interior of the mass and causes part of the carbon to liquefy and deposit minute crystals These crystals are subsequently recovered by dissolving the mass of cooled iron, and further purified from graphite and silica

The electric furnace has yielded another product which, while, strictly speaking, it is not a synthetic gem, is nevertheless essentially an artificial gem Imperfect rubies, chips, and small stones are fused in the furnace, together with a small amount of coloring oxide, such as that of chromium The fused product is then cut and polished, and the result is a gem of good color and fairly large size Emeralds and other colored stones have been made by this method, and so important has the industry become that the courts have been called upon to decide what constitutes an artificial gem A decision which has applied to the rubies was obtained, in which it was decided that the word applied only to the red-colored corundum or anhydrous aluminium oxide that also occurs already formed in nature

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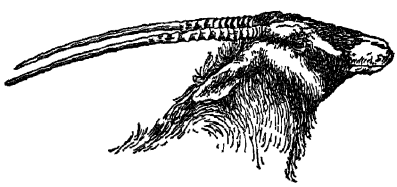
GEMSBOK, gĕmz'bŏk (Dutch, chamois buck). A large South and West African antelope (*Oryx gazella*), representing a group which contains the beisa (q v) and similar straight-horned antelopes of the North (See ORYX) It is a



HEAD AND HORNS OF GEMSBOK

heavy, stout animal, about 4 feet high, with rough reversed hair on the neck and along the ridge of the back, large pointed ears, and almost perfectly straight horns, sometimes over a yard long, in the plane of the forehead, little diverging, and ringed at the base The record length is 47½ inches. The colors are harshly contrasted, dark rusty gray above, and white on the

underparts, separated by a broad dark-brown or black band, the head white, with black traverse bands, the thighs black, and the legs white The hoofs are remarkably long and well adapted to the rocky mountainous districts which the animal frequents It will thrive in utterly waterless and apparently barren deserts, goes about in pairs or small bands, and is by no means fleet of foot, but in lieu of speed for escape is able to defend itself against even the lion with its spearlike horns, which are sought by the negroes to be converted into weapons Its flesh and hide are highly esteemed The "bastard gemsbok" of the Boers is the roan antelope (q v) See Plate of ANTELOPES

GEMUNDER, ge-mun'dēr, AUGUST (1814–95) A naturalized American violin maker, born at Ingelfingen, Wurttemberg With his brother George (q v) he learned his trade under the famous Baptiste Vuillaume, of Paris, but in 1846 he settled at Springfield, Mass, and established himself in business there He speedily earned an international reputation and in 1860 moved his business to New York Several famous violinists used his instruments, but perhaps his greatest masterpiece was the celebrated copy of Sarasate's Amati, which that artist pronounced equal to the original He died in New York

GEMUNDER, GEORGE (1816–99). A brother of August Gemunder (q v), born at Ingelfingen He worked at violin making in Germany and France, followed August to the New World in 1847, and settled in New York in 1852 His instruments took the first prize at the great English Exhibition of 1851 In 1873 his copy of a Guarnerius was pronounced by the jury of awards at the Vienna Exhibition to be a genuine instrument He claimed as the secret of his success that he did not use chemicals in the preparation of his wood, but instead used it in its natural condition His instruments were even finer than his brother's and were beyond question the best violins ever made in the United States He was the author of a book entitled *George Gemunder's Progress in Violin-Making* (Astoria, N Y, 1881) His death occurred in New York

GEN'ABUM CARNUTES, CHARTRES

GENALA, jä-na'la, FRANCESCO (1843–93). An Italian legislator, born at Soresina, Province of Cremona He took a conspicuous part in regulating the finances of the city of Florence, where he was a lawyer after 1862, and where he published *Rappresentanza proporzionale* (1871) In the House of Deputies he was a member of the Left, and in 1883 was appointed Minister of Public Works in the Depretis cabinet, and held this portfolio again in Giolitti's cabinet of 1892–93 The leasing of the Italian railroads to three great corporations in 1885 was due chiefly to him

GENA'VA The Latin for Geneva (q v), a city in Switzerland

GENAZZANO, jä'nät-sa'nō A town in the Sabine Mountains, Province of Rome, central Italy, 27 miles east of Rome It is famous for the chapel of the Madonna del Buon Consiglio, visited by many pilgrims, at the festivals of the Virgin, and for the old castle of Colonna Pop (commune), 1901, 4121, 1911, 4206

GENDARMES, zhäN'därm' (Fr, men at arms) From 1445 to the time of the French Revolution, the most distinguished cavalry corps in the service of the French kings, to whom they formed a sort of bodyguard They were dressed in armor and had five soldiers of inferior rank to wait on them Under existing arrangements the gendarmes constitute a military police and comprise both cavalry and infantry The force consists principally of soldiers taken from the army, generally on account of intelligence and good conduct The men receive much higher pay than the rest of the army, of which, however, the corps is a part, liable in cases of emergency to be sent on active service The gendarmes amount to about 21,000 men and are intrusted with the execution of many of the most delicate details of government They form a national police, embracing all the departments and colonies of France In war they are employed for the maintenance of order in camp and on the march. Germany and Russia likewise possess a force of similar nature, combining the functions of soldier and national police officer These are mostly employed on patrol duty in rural districts and on the border Consult H Delattre, *Esquisse historique de la gendarmerie française* (Paris, 1885)

GEN'DER (OF *gendre, genre,* Fr *genre,* from Lat *genus,* race, from *gignere,* to beget, Gk. *γίγνεσθαι, gignesthai,* Skt *jan,* to be born) A grammatical category, commonly regarded as indicating the sex of a noun Gender is either grammatical or natural In the former case there is no necessary coincidence of sex and gender. Thus, Lat. *femina,* woman, is both naturally and grammatically feminine, but Lat. *mensa,* table, is naturally sexless and grammatically feminine In natural gender, on the other hand, sex and gender must agree, as in Eng *man* (masculine), *woman* (feminine), *thing* (neuter). In the Indo-Germanic languages (q v) the inflectional group, as Greek, Russian, or German, have grammatical gender, while the analytic group, as English or Persian, have only natural gender, except in a few apparent instances, as Eng *ship* Gender in all Indo-Germanic tongues is divided into three classes: masculine, feminine, and neuter It was long supposed, according to a theory promulgated by Jakob Grimm (q v), that grammatical gender depended upon personification, that, in other words, a noun had sex ascribed to it on account of some attribute, either real or fancied Thus, Lat. *sol,* sun, was masculine because of its burning rays and the energy which it imparts to all human activity; *luna,* moon, was feminine as being gentle and calmly beneficent, *mare,* sea, was neuter from its obvious sexlessness The faults of this theory in a wider study of language, e g, the fact that *Sonne,* sun, is feminine in German, while *Mond,* moon, is masculine, led to a rejection of Grimm's theory and the substitution of entirely new hypotheses. A study of gender, however, as of all primary linguistic categories, is incomplete if the Indo-Germanic languages alone are considered Natural gender, the application of which is too obvious to require exemplification, is found in practically all languages, even the most primitive, many of which have no grammatical gender, as in Dinka Negro (*tiṇe džonkor,* female horse; *muor adžid,* bull fowl), Melanesian and Polynesian (as in the dialect of the island of Viti, *a toa tainane,* of fowl male, *a toa alewa,* of fowl female), or Annamese (*kon-trai,* son child; *kon-gai,* daughter child). Other languages have a division into animate and inanimate, as Algonquin, Iroquois, and Cherokee, or the Dra-

vidian high caste and low-caste genders More elaborate schemes are also found, as in certain languages of the North Caucasian group, which have six genders—for animate and inanimate, rational and irrational, masculine and feminine. (See GEORGIAN OR IBERIAN LANGUAGE) It seems safe, therefore, to conclude, on such analogies as these, that the most primitive form of the pre-Indo-Germanic languages also had a natural rather than a grammatical gender The question then arises as to the origin of grammatical gender This problem, one of the most difficult of all those presented by linguistic science, has been answered in several ways, and all theories concerning it must be regarded, in the present state of linguistic knowledge, as merely tentative Of the two most plausible, the first is the one defended by Brugmann (q v) The masculine-neuter must be set over against the feminine In this all scholars of prominence are agreed It is then to be noted that the nominative plural neuter and the so-called nominative singular feminine are identical in their termination, as Vedic Skt *yugā*, yokes (classical Skt. *yuganı*), and *sēnā*, army (cf with shortened final syllable, Gk *δῶρα*, gifts, with *χώρα*, land, Lat *oppida*, towns, with *animā*, soul, while Oscan and OChurch Slav retain representatives of original *-ā* in the neuter plural, as Oscan *prúftú*, things proved, beside *via*, way, and OChurch Slav *rucha*, garments, beside *noga*, foot) Again, in Greek and Avesta a neuter-plural subject takes a singular root, as *τὰ οἰκήματα ἔπεσεν*, the buildings fell, *yā karasatē*, what things shall be done In view of facts like these, the feminine singular is regarded as a collective, originally identical with the neuter plural This has an interesting and suggestive analogue in Arabic, where the so-called broken plural, which is preeminently a collective word, takes its verb in the feminine singular, as *jā'a rajulun*, there came a man, but *jā'at rijālun*, there came men. The termination of the broken plural is also often identical with that of the feminine singular, as *ikhwatun*, brothers, from *akhun*, brother (cf. *malikatun*, queen, from *malikun*, king) This theory, however, is not altogether adequate, and it has been supplemented by such scholars as Wheeler and Jacobi. They have pointed out the influence of the pronoun, whose declension was perhaps once entirely unrelated to that of the noun, upon the noun. Here the origin of grammatical gender seems to lie. It is true that the feminine singular was originally a collective noun, merely differentiated in meaning from the neuter plural, and that it was occasionally concretized to denote a female being, as in the case of the Gk *γυνή*, woman, Bœotian *βανά*, Skt *gnā* (originally 'bearings' in the discrete, then 'bearing' in the abstract, finally she who bears' in the concrete) From such instances many words in *-ā* were termed feminine by analogy (q v). On the other hand, the pronoun in all languages expresses natural, not grammatical, gender, denoting male, female, and sexless The feminine singular of the pronoun may have terminated originally in *-ā*, like its neuter plural, but independently of it, differing herein from the noun, as already stated On account of the true feminine termination of the pronoun, the collective noun, which chanced to coincide with it in form, was regarded as feminine, and by analogical extension a numerous class of "feminines," some female and others sexless, was evolved In this way the so-called feminine gender probably arose The so-called masculine gender was similar in development The neuter originally differed from the masculine only in the nominative singular (as Lat *servus, servum*, slave, but *templum, templum*, temple), and its plural, except for the collective form in *-a* (the so-called nominative and accusative, as *templa*, temples), was merely an extension analogical with the masculine The neuter seems to have been a passive noun, while the masculine was active, and it was thus originally identical with the so-called accusative or objective case (cf Lat *servus currit*, the slave runs, but *servum cædit*, he kills the slave, with *templum cadit*, the temple falls, and *templum eruit*, he pulls down the temple) The principle of personification, on which Grimm laid such emphasis, was developed after, not before, grammatical gender The original independence of natural gender is seen from the so-called epicene nouns, which have but one grammatical gender for both natural ones, as Lat *lepus*, hare (masculine), *vulpes*, fox (feminine), Ger *Hase*, hare (masculine), *Mause*, mouse (feminine), which leads to such apparent incongruities as *vulpes mascula*, male fox, *weiblicher Hase*, female hare With the decay of the inflection grammatical gender is gradually disappearing, and the more primitive system of natural gender, so long superseded, is resuming its original position, so that the classification of nouns as masculine, feminine, or neuter is being based more and more on sex, and not gender

In English, where grammatical gender does not exist, natural gender is indicated in three ways The first and most common method is by distinctive terminations for the feminine, especially by *-ess* (of Romance origin), as *emperor, empress, lion, lioness, count, countess;* and also by *-ix* (of Latin origin), as *executor, executrix, -ine* (of Latin-Romance origin, primarily an adjectival formation of relation, as Lat *regina*, queen, lit kingly woman), as *hero, heroine*, and other more sporadic terminations The second method is by prefixing words denoting the sex, as *he-goat, she-goat, manservant, maidservant*, etc The third method is the use of different words for the two sexes, as *king, queen, boy, girl, stag, hind*, and the like

In the highly inflected languages there are certain terminations distinctive of the different genders It is probable, indeed, that originally every noun or adjective had a suffix indicative of the sex, real or imaginary, of the object designated, although, like other inflections (q v), these suffixes of gender were in process of time mutilated beyond recognition or in many cases altogether worn off The terminations most characteristic of the three genders in Latin are masc *us*, fem *a*, neut *um*, corresponding to the Greek *os, ē, on* In a great majority of the adjectives in both those languages the genders are thus marked In English the gender of a noun affects only the personal pronoun substituted for it; in most other languages the adjectives (including the articles) have different forms for the several genders—a useless complication, in the case of modern languages at least See ADJECTIVE.

The prevalent feminine termination in German is *-in*, as in *Tanzerin*, a female dancer (Fr *danseuse*); of this there are two instances in English, in the provincial *carlin*, the fem of *carl*, and *vixen* = Ger. *Fuchsin*, a female fox.

This affix was already in use in Latin, as in *regina*, a queen (*reg(s)*, a king), and in this form it is used in Europe generally to feminize proper names, e g., *Georgina, Wilhelmina, Caroline*

In such pairs as *son—daughter, man—maid, horse—mare, cock—hen,* there is no etymological relation between the words, they are from distinct roots But with regard to *hen*, e g, the Anglo-Saxon had the two forms, *han* for the male, and *hen* for the female, and *mare* was originally applicable to both sexes, as *horse* still is (cf Fr *maréchal*, Frankish *marahskalk*, originally an officer who had charge of the horses, *marah* being the equivalent of the Eng *mare*) The oldest-known form of the Teutonic speech, the Gothic, had the two words *magus*, son, and *magaths*, daughter, both from the root *mag*, to beget, or to make *Magaths* has become in Ger *Magd*, in Eng *maid, magus* has been lost in the Teutonic tongues, but it is possibly represented by the Celtic *mac* (son), which may be derived from the same root *King, queen*, were in Skt *ganika*, father, and *goni*, mother, both from the root *gan*, to generate, produce The masculine form appears in OGer as *chuning*, in mod Ger *konig*, in Eng *king*, the feminine was represented by the Gk γυνή, a woman, as well as the Saxon *cwen*, Swed *quinna*, OEng *quene* or *quean* applied to a woman generally, and the modern *queen*, the chief woman of the land See GRAMMAR

Consult Delbruck, *Vergleichende Syntax der indogermanischen Sprachen* (3 vols, Strassburg. 1893–1900), Brugmann, *Nature and Origin of the Noun Genders in the Indo-European Languages* (New York, 1897), Jacobi, *Compositum und Nebensatz* (Bonn, 1897), Wheeler, "Origin of Grammatical Gender," in *Journal of Germanic Philology*, ii (Bloomington, Ind, 1898), Paul, *Prinzipien der Sprachgeschichte* (4th ed, Halle, 1909); Wundt, *Volkerpsychologie* (2d ed, Leipzig, 1904), La Grasserie, *De l'expression de l'idée de sexualité dans le langage*, in vol. lviii of the *Revue Philosophique* (Paris, 1904), Lommel, *Studien uber indogermanische Femininbildungen* (Gottingen, 1912)

GENEALOGY, jĕn'ē-ăl'ŏ-jĭ *or* jē'nē- (Lat. *genealogia*, Gk γενεαλογία, pedigree, from γενεαλόγος, *genealogos*. one who draws up a pedigree, from γενεά, *genea*, family + -λογία, *-logia*, account, from λέγειν, *legein*, to say) The science whereby the history of the origin and descent of a family or race may be ascertained. There has been a growing interest, especially in the United States, in matters pertaining to genealogical research, and although it is not of sufficient importance to rank as an independent science, it forms a very important part of history. This is largely due to the growth of the patriotic hereditary societies which have flourished so extensively in the United States since 1890. In these organizations membership is granted only to those who are descended from an ancestor who was conspicuous in some historic event Its literature is for the most part shut up in the archives of historical libraries, but that natural instinct which prompts one to love the place of his birth and the chief circumstances in the lives of his progenitors is gradually attracting the attention of the intelligent public

From the earliest times, genealogy has always formed the basis of all true history In the ancient records of Assyria, Egypt, and Arabia, the lineage of an individual was the thread upon which were strung the stirring events of centuries, and so important a place did its preservation occupy among the Jewish people that it was established as a positive obligation upon every Levite of the temple Nor was this genealogical form of history peculiar to Semitic races The first Greek records were those of ancestry The progress of civilization in states, and in particular the institution of corporations and guilds in the towns, afforded a wider scope for genealogy But the absence of criticism and the desire to flatter the great were the causes of introducing the most ridiculous fables into genealogy Ancestors were fabricated in the most impudently false manner, and families carried back in an unbroken line, not only to the age of Charlemagne, but even, in many cases, to the heroes of the Trojan War The fact, however, is that scarcely any family, however distinguished, can trace its ancestors even to the middle of the eleventh century

GENÉE, zhe-nā', ADELINE (1878–) A noted ballet dancer, born at Aarhuus, Jutland, Denmark She first danced in public when only eight years old, and in 1895 she had become principal dancer at the Copenhagen Opera House After appearing in the opera houses of Berlin and Munich she entered upon a 10-year engagement with the Empire Theatre of Leicester Square, London, in 1897, taking leading parts in all the notable ballets there produced In 1908 she appeared with great success in "The Soul Kiss" in New York City and subsequently toured the United States in the same ballet She played return engagements in New York in 1909, 1910, and 1912, reappeared in London in 1911, and toured in Australia in 1913

GENÉE, zhe-nā', RICHARD (1823–95). A German opera composer and librettist, born at Danzig Upon abandoning medicine for music he became a pupil of Stahlknecht in Berlin He held many important appointments, principally as orchestra leader, in the following towns and cities Riga, Reval, Cologne, Aix-la-Chapelle, Danzig, Dusseldorf, Mainz, Schwerin, Amsterdam, Prague, and Vienna His operettas had considerable local success, but are little known abroad They are as follows *Der Geiger von Tirol* (1857), *Der Musikfeind, Die Generalprobe, Rosina, Am Runenstein* (1868), *Der Seekadett* (1876), *Der schwarze Prinz, Im Wunderlande der Pyramiden, Die letzten Mohikaner, Die Piraten, Nisida, Zwillinge, Die Dreizehn* (1887) He also wrote some of his own librettos, and others for Millöcker, Strauss, and Suppé His death occurred at Baden, near Vienna.

GENÉE, RUDOLF (1824–1914) A German author and Shakespearean reader He was born in Berlin, a son of Friedrich Genée, formerly stage manager of the Konigstadtisches Theater in that city He at first devoted himself to wood carving under Professor Gubitz, but later wrote several successful plays, of which the comedy entitled *Das Wunder*, performed at the Court Theatre, Berlin, in 1854, was particularly successful For a time, as editor of the *Danziger Zeitung* and of the *Koburger Zeitung* (1861–64), he published his *Frauenkranz*, a series of readings on dramatic female figures in history It was at Coburg that he began his public readings of Shakespeare, which he continued with marked success at Berlin, Dresden, Vienna, and

other cities of Germany His works include *Geschichte der shakespeareschen Dramen in Deutschland* (1870), *Shakespeares Leben und Werke* (2d ed, 1874), *Hundert Jahre des königlichen Schauspiels in Berlin* (1886), *Marienburg*, a novel (2d ed, 1886), *Bismarckiade* (1891), *Zeiten und Menschen* (1897); *W Shakespeare in seinem Werden und Wesen* (1905)

GENELLI, jä-nĕl'lē, BONAVENTURA (1798–1868) A German painter and designer. He was born in Berlin, the son of Janus Genelli, a landscape painter Although he painted biblical and mythological subjects, he was more celebrated for his bold and ingenious designs after the manner of Carstens He had the imagination of a poet, but in working rarely soared beyond contour and silhouettes Everything was sacrificed to line He essayed much in water color and oil, but failed to express himself with success in those mediums He was a pupil of the Berlin Academy, where he studied under Bury and Hummel, and also spent 10 years in Rome, where he was especially influenced by Koch, Cornelius, and Friedrich Muller In 1836 he settled at Munich, where he lived in poverty, but executed his principal works. In 1830 he removed to Weimar, where he was appointed professor Among his best designs are the copper prints of the "Life of a Profligate" and the "Witch" He also designed 48 outline illustrations for Homer and 36 for Dante In the Leipzig Museum are his water color "Triumph of Bacchus and Ariadne" and four others The Vienna Academy possesses 284 of his plates, and six of his best oil paintings are in the Schack Gallery, Munich, including 'Hercules and Omphale," "Abraham and the Angels," and a drop curtain with allegories He died in Weimar, Nov 13, 1868 Consult Pecht, *Deutsche Künstler des 19 Jahrhunderts* (Ser 2, Nordlingen, 1879), and Muther, *History of Modern Painting* (4 vols., London, 1907)

GEN'ERAL (Lat. *generalis*, general, belonging to a race, from *genus*, family, from *gignere*, to beget) A military rank and title denoting an officer holding a general command, or a rank and grade equivalent thereto In modern armies, practically every officer commanding an organization of troops larger than a regiment is a general officer. In the United States the rank has the following grades brigadier general, major general, and one lieutenant general in supreme active command of the army as a whole Officers of other ranks are sometimes given the temporary and relative rank of general, as inspector general, judge advocate-general, quartermaster-general, etc. In European armies the rank of general is a step higher than that of lieutenant general, and is the next in importance to field marshal in England, and to marshal in the armies of continental Europe See RANK AND COMMAND.

The title is also applied in the Roman Catholic church to the superior head, under the Pope, of a religious order. The governing authorities of the monastic orders may be arranged in three classes· (1) the superiors of individual convents or communities, called in different orders by the various names of abbot, prior, rector, guardian, etc , (2) the provincials, who have authority over all the convents of an entire province, the provinces, in the monastic sense of the word, being usually coincident as to local limits with the several kingdoms in which the order is established, (3) the general, to whom not only each member of the order, but all the various officials of every rank, are absolutely subject The general is usually elected by the general chapter of the order, which, in the majority of orders, consists properly of the provincials, with whom, however, are commonly associated the heads of the more important monasteries, as also the superiors of certain subdivisions of provinces The office of general in most orders is held for three years In that of the Jesuits it is for life, but in all, the election of the general chapter must be confirmed by the Pope In most orders, too, there is assigned to the general a consulter (*admonitor*) or associate (*socius*), who, however is only entitled to advise and has no authority to control the superior The general also is supposed to consult with, and to receive reports from, the various local superiors He sends, if necessary, a visitor to inquire into particular abuses or to report upon such controversies as may arise, and he holds a general chapter of the order at stated times, which differ according to the usage of the several orders The general is exempt from episcopal jurisdiction, being subject to the immediate jurisdiction of the Pope He lives in Rome, where he has certain privileges, the most important being the right to sit and vote with the bishops in a general church council

GENERAL ASSEMBLY See PRESBYTERIANISM

GENERAL AVERAGE. See AVERAGE, IN MARITIME LAW

GENERAL BAPTISTS. See BAPTISTS

GENERAL CONFERENCE MENNONITES. See MENNONITES

GENERAL EDUCATION BOARD An organization established for the purpose of distributing gifts made by John D Rockefeller for educational purposes It was chartered by Congress in 1903 The board has received gifts from Mr Rockefeller amounting to $50,000,000, of which $30,000,000 has been set aside as endowment As will appear below, it is the policy of the board to make its gifts to existing agencies and institutions, and accordingly it does not undertake independent educational work The gifts are made mainly for the four following purposes·

1 The promotion of practical farming in the Southern States After a careful study of educational conditions in the South the board decided that the problem which needed greatest assistance was the improvement of farming and of rural life in general Through the Department of Agriculture the board has, since 1906, made appropriations amounting in 1912–13 to $659,700 for the purpose of promoting agriculture by the establishment of demonstration farms under the direction of the late Dr Seaman A Knapp According to recent reports, 236 men were engaged in supervising such farms, while 23,301 farmers were employing improved methods under their direction, and these in turn were influencing the work of nearly 200,000 farmers in the South In connection with the public schools State agents have been appointed to conduct demonstration work among boys under actual farming conditions and by the establishment of corn clubs To improve home life and household management in connection with the farms, girls' clubs have also been organized —some under the titles of girls' canning and poultry clubs.

2 The establishment of public high schools in the Southern States For this purpose the board appropriates to the State universities in the South sums to pay the salaries of high-school representatives to travel throughout their States and stimulate public sentiment in favor of high schools As a result of this work, 912 high schools have been established in 11 Southern States, $9,306,580 have been raised for buildings and maintenance, and the annual sum available for their support has been increased $1,332,667

3 The promotion of institutions of higher learning The board, after careful inquiry into the needs, the financial and educational strength, and the relations to other institutions of higher learning in the respective States, makes conditional appropriations to institutions of higher learning that wish to raise money The gifts are made for endowment The board has made such conditional appropriations to the amount of $8,817,500, gifts which are towards an approximate total of $41,020,500

4 Schools for negroes The board has made contributions, amounting to $620,105, to schools for negroes, mainly those for the training of teachers. The board also contributes towards the expenses of two rural school supervisors connected with the State department of education for the development of better school, economic, and social conditions in rural areas, while negro farmers also participate in the demonstration work mentioned above

In May, 1914, the gifts of the General Education Board appropriated for these purposes aggregated $1,400,000

GENERALIFE, hä-nä-ra-lē'fā (Ar. *jannat-al-arīf*, Garden of the Architect) A summer palace of the Moorish kings, at Granada, east of the Alhambra, now the property of the Marquis of Campotejar The extensive grounds are traversed by the waters of the Darro The court contains cypresses dating from the thirteenth century and communicates with a raised garden and belvedere, which affords an extensive view

GENERAL ISSUE. In the English law of pleading, the form in which the defendant traverses or meets with a simple denial the whole allegation, or the principal fact on which the plaintiff relies in his declaration Thus, in actions founded on wrongs the general issue is "not guilty", in actions of debt, that the defendant never was indebted, in actions on a deed or bond, *non est factum*, i e, it is not the deed of the defendant Under this issue the defendant may prove that he never executed the deed, but not that it is bad in point of law

In *criminal proceedings* the general issue is "not guilty," by which plea, without further form, every person not having the privilege of peerage, upon being arraigned upon any indictment for treason, felony, or piracy, is deemed to have put himself upon the country for trial Where a prisoner refuses to plead, a plea of not guilty may be entered for him (7 and 8 Geo IV, c 28) Under the plea of not guilty the prisoner is entitled to give in evidence not only everything which negatives the charge, but also all matter of excuse or justification.

This form of plea survives and retains its principal characteristics even under the reformed systems of pleading which, in England and many of the United States, have supplanted the common-law system. See PLEA, PLEADING

GENERALIZATION See INDUCTION

GENERAL PAUSE In music, a pause for all instruments or parts during a composition The name is especially applied to rests of considerable duration, when so introduced as to break the rhythm and produce a striking effect A "hold" (⌒) over the rest mark of a general pause indicates that its length is indeterminate and so destroys the rhythmic value of the rest by suspending the counts or beats See HOLD

GENERAL SHIP A ship which has been advertised by the owners to take goods from a particular port at a particular time, and which is not under any special contract to particular merchants The owners in this case engage separately with each merchant who applies to them to convey his goods to the ship's destination The contract between the owners, or the master acting in their behalf, and the proprietors of the goods, may in the case of general ship be established by parole evidence, and, indeed, there is rarely any other writing on the subject beyond the advertisement and the bill of lading In a general ship, the master being intrusted by the owners with full power to contract for and take in goods, no agreement for freight which any one may have made with the owners, independently of him, will be effectual to secure room in the vessel All such agreements must be intimated to the master, or those acting for him on board, before he has engaged freight for the whole vessel By such intimation a preference will be secured over the merchant who brings his goods to the ship's side on chance If the owners of a general ship have advertised her as bound for a particular port, they must give notice to every person who may ship goods on board, of any alteration in her destination, and they will be liable for the consequences of neglecting to do so The reduction in the number of sailing ships in recent years and the great increase in the number and capacity of freight steamers running on regular routes and carrying freight for all shippers at rates that are usually published have reduced the importance of the laws and practices concerning general ship

GENERAL STAFF An organization of superior or selected officers, appointed for duty at the headquarters of the army or on the staff of a general officer commanding, whose duties may be generally described as converting the ideas of their chief into orders, not only by conveying them to the troops, but by working out all necessary matters of detail The general staff organization was originally peculiar to Germany, but is now being generally adopted throughout Europe The great general staff, *Grosser Generalstab*, as distinct from *Generalstab*, in the German army of to-day, is a body of general staff officers who are not attached to any corps, intrusted with the duties of drawing up and preparing schemes for the strategical concentration of the army in certain particular directions by road and rail, with collecting and estimating the strength, etc, of the various European armies, with the study of theatres of war, and with the preparation of military maps

The *general staff corps* of the United States army, created in conformity to the Act of Congress approved Feb 14, 1903, and subsequently amended, is composed of 4 general officers (the chief of staff, the assistant chief of staff, the chief of the division of militia affairs, the chief of the coast artillery corps), 4 colonels, 6 lieu-

tenant colonels, 12 majors, and 12 captains Two of these, the chiefs of coast artillery and of the division of militia affairs, are members of the general staff corps by law All the other officers are detailed for service in the corps for a period of four years under rules of selection prescribed by the President Upon expiration of the four-year detail these officers return to the branch of the army in which they hold permanent commissions The law established the general staff corps as a separate and distinct staff organization, the chief of which has supervision, under superior authority, over all branches of the military service, line and staff, with a view to their coordination and harmonious cooperation The general staff corps, under the direction of the chief of staff, is charged with the duty of investigating and reporting upon all questions affecting the efficiency of the army and the state of preparation for military operations It prepares plans for the national defense, studies possible theatres of war and strategic questions in general, and collects military information at home and abroad

The members of the general staff are assigned to two general classes of duty first, to duty on the staff of commanders of armies, divisions, separate brigades, and territorial departments —these officers are collectively known as the *general staff serving with troops*, second, to duty under the immediate direction of the chief of staff at the War Department, Washington, D C The latter constitute the *War Department general staff* The senior of the general staff officers on the staff of a commander is called the chief of staff of that command He sees that the ideas, intentions, and decisions of the commander are executed, coordinates the work of all the other staff officers, is responsible for the performance of the necessary reconnaissance and security of the command, establishes an *information division*, exercises a general supervision over all records and returns, and sees that a war diary is kept

All vacancies below the grade of brigadier general are filled on the recommendation of a board of five general officers of the line, not more than two of whom shall be general staff officers Since its creation by law in 1903, the general staff corps, composed of officers from the line of the army, to which they return after a four-year detail, has fully justified its existence by steadily and progressively increasing the administrative and fighting efficiency of the army Consult *United States Army Regulations* (Washington, 1913) and *Field Service Regulations, United States Army* (ib, 1914) See STAFF, ARMY ORGANIZATION

GENERAL THEOLOGICAL SEMINARY. The leading seminary in the United States of the Protestant Episcopal church. The seminary was established by order of the General Convention in 1817, and instruction was begun in New York City in 1819 In 1820 the seminary was removed to New Haven, but was reestablished in New York in 1822 on a part of the plot of land given in 1819 by Clement C Moore. For many years the seminary suffered severely from financial deficiencies, and it was not until the administration of Eugene A Hoffman, dean of the school from 1878 until his death in 1902, that it was placed upon an independent basis Dean Hoffman's personal gifts to the seminary were most generous The theological course proper extends over three years, and there is also a graduate course The degrees of D D and B D are conferred, the former is both a higher academic and an honorary degree, while the latter is conferred on graduates of any theological seminary of the Episcopal church or of any church in communion therewith who has accomplished prescribed work and written a thesis satisfactory to the faculty This degree is not conferred "in course" nor "honoris causa" The control of the seminary is vested in a board of trustees composed of the presiding Bishop of the church, the Bishop of the diocese in which the seminary is located, the dean of the seminary, and 10 bishops, 10 presbyters, and 10 laymen elected by the General Convention, and three bishops, three presbyters, and three laymen elected by the alumni of the seminary The student attendance in 1913–14 was 137 No tuition fee is charged, and prizes of value are offered Within 30 years the student body has largely increased, and extensive buildings have been erected, including the library (59,000 volumes), Hoffman Hall, the chapel of the Good Shepherd, and nine dormitories The productive funds in 1914 amounted to about $2,170,000 The dean in 1914 was W L Robbins, D D

GEN'ERA'TION See REPRODUCTION.

GENERATION (Lat *generatio*, from *generare*, to beget, from *genus*, family) In mathematics, the formation of a magnitude or geometric figure by the movement of another magnitude or figure For example, a moving point describes a line, a moving line, in general, describes a surface, and a moving surface, in general, describes a geometric solid An angle is said to be generated by revolving a line about a fixed point from an initial position A figure called the generatrix, moving according to a fixed law, generates a particular figure called the generant, e g, a straight line moving so as constantly to pass through a given curve, and to remain parallel to its original position, generates a cylindrical surface The given curve is called the directrix. The volume of a ring generated by revolving a polygon about an axis not cutting the polygon is equal to the area of the polygon multiplied by the length of the path of the mean centre of the polygon This proposition is known as Pappus's or Guldin's theorem, Pappus (q v) being the real discoverer.

GENERATION, ETERNAL See TRINITY, DOCTRINE OF THE

GENERATIONS, ALTERNATION OF. See ALTERNATION OF GENERATIONS

GEN'ERATIVE CELL. A term, technically applied in seed plants to the first cell which appears in the sperm series In gymnosperms (pines and their allies) it is the cell which divides to form the stalk and body cells, the latter of which subsequently divides to form the male cells In angiosperms (true flowering plants) it is a cell which is formed by the first division of the nucleus of the pollen grain and in turn by division forms the male cells See SPERMATOPHYTE

GENERATOR, ELECTRIC See DYNAMO-ELECTRIC MACHINERY and Plate.

GEN'ERA'TRIX See GENERATION.

GENESEE (jĕn'e-sē') **RIVER** (Amer. Indian, shining valley, or beautiful valley) A river which rises in Potter Co, Pa, and which empties into Lake Ontario 7 miles north of Rochester (Map New York, C 4) It is about 135 miles long and is navigable for lake vessels

for only 5 miles. At Portage there are three falls of 65, 90, and 110 feet respectively, and within the city of Rochester there are three more of 96, 26, and 83 feet, all of which furnish excellent water power

GENESEO, jĕn'ē-sē'ō A city in Henry Co, Ill, 20 miles east by south of Moline, on the Chicago, Rock Island, and Pacific Railroad (Map Illinois, D 3) It is the seat of the Geneseo Collegiate Institute and contains a city hospital and public library It is in a rich agricultural and stock-raising region, has a canning factory, and has extensive trade in farm products and live stock Under a charter of 1865 it is governed by an annually elected mayor and a unicameral council The city owns and operates its water works Pop, 1900, 3356, 1910, 3199

GENESEO. A village and the county seat of Livingston Co, N. Y, 28 miles by rail south of Rochester, on the Genesee River, and on the Erie Railroad (Map New York, C 5) It is the seat of a State normal school and has the Wadsworth Public Library The village is in an agricultural region, has a large vegetable canning factory, and manufactures jam, flour, gloves and mittens The water works are owned by the municipality Pop, 1900, 2400, 1910, 2067

GEN'ESIS (Lat. from Gk γένεσις, *genesis*, origin, from γίγνεσθαι, *gignesthai*, to become). The name given in the Greek version to the first book of the Bible In the Hebrew canon it is called *B'reshith* (in beginning), from the initial word, in the Talmud it is sometimes referred to as "the Book of Creation" The Masoretic division into 12 *parashioth* (out of 54 in the Pentateuch), or 45 *sedarim* (out of 154 in the Pentateuch), is based on the custom of reading through the Law in one year or three years respectively the division into 50 chapters is of Christian origin, 20 of the breaks being contrary to Masoretic custom R Solomon b. Ismael (c 1330 A D) adopted the Christian numeration of chapters and placed the numerals in the margin of the Hebrew Bible, for controversial purposes, in order to facilitate reference to particular passages In the Complutensian polyglot the Masoretic sections were disregarded, and in 1517 Felix Pratensis indicated in the margin the Christian chapters in Hebrew letters A much earlier division seems to be indicated by the inscription *Toledoth* (generations, history), which occurs 10 times in the course of the book. The book naturally falls into two parts, chaps i–xi and xii–l The first extends from the beginning to the call of Abraham and includes the accounts of creation, the fall, the generations between Adam and Noah, the deluge, the giants, the tower of Babel, and the dispersion of the human race, and the generations between Noah and Abraham The second gives the history of the patriarchs—Abraham, Lot, Ishmael, Isaac, Jacob, Esau, and Joseph—and concludes with the settlement of Jacob's family in Egypt.

The Jewish canon makes Genesis the first of a series of five books, which it comprises under the term *Torah*, or Law, and according to the tradition of the synagogue Moses was the author of all of these books. There is no intimation in Genesis itself as to its authorship. But since, in spite of its distinct subject matter and origin, it forms a natural and appropriate introduction to the history of Moses and the legislation, it was inferred at an early age and long maintained that Genesis too was written by the author of the following books, who was held to be Moses Some indications of a later date, such as references to Dan, the Canaanites who were then (in the time of Abraham) in the land, the kings who reigned in Edom before there was a king in Israel, and some other facts, led many scholars, among them Ibn Ezra, Carlstadt, Masius, Pereira, Hobbes, Spinoza, Simon, and Le Clerc, to believe that there was post-Mosaic material in the book In order to offset the tendency to deny the Mosaic authorship, Astruc published in 1753 his conjectures as to the documents that may have been used by Moses in Genesis He observed that in some sections one divine name (Yahwe), in other sections another (Elohim), was employed by preference, and assumed that these sections represented different documents written by various patriarchs and incorporated by Moses in his narrative, and that he used also certain shorter fragments Through Eichhorn, Ilgen, and a long line of distinguished scholars this conjecture was further developed A particularly clear description of these sources was given by Hupfeld By the end of the nineteenth century a very large number of Protestant, and some Catholic and Jewish, scholars had reached the conclusion that three documents, usually designated as J, E, and P, and some fragments made up the Book of Genesis The prevailing view was that J, the Judæan or Yahwistic document, was written in the ninth or eighth century, but subsequently enlarged, that E the Ephraimitish or Elohistic document, was about a century younger, and was likewise amplified before the union of the two, and that P, the Priests' Code, was post-exilic and also somewhat expanded before the final redaction of the Pentateuch As further research seemed to show that the same documents were used in Exodus, Leviticus, and Numbers, the defenders of the Mosaic authorship, among them such Protestant scholars as Hengstenberg, Keil, and Green, and such Catholic scholars as Welte, Knabenbauer, Ubaldi, Kaulen, and Cornely, rejected the critical analysis, while those who accepted this analysis either rejected the Mosaic authorship of the Pentateuch in toto, or ascribed to Moses only some sections distinctly claimed for him in the other books, but not the Book of Genesis (See PENTATEUCH) Recently some independent scholars, among them Eerdmans, Wiener, Dahse, and Schmidt, have been led by text-critical studies to abandon the current system of analysis They do not deny, however, the composite origin of Genesis or of the Pentateuch, but only the applicability of the criteria generally relied upon in the analysis of sources and the consequent division Thus, Schmidt has shown that in the story of the garden of Eden, regarded as the finest and most characteristic example of the Yahwist's art, the Greek translator in the third century B C. in all probability had before him a Hebrew text in which the divine name Yahwe was never used, yet he does not doubt the separate origin of the two stories of creation (q.v) Eerdmans has given good reasons for rejecting the theory that the names Jacob and Israel are characteristic of the supposed Yahwistic and Elohistic documents, but he recognizes that the name Israel was used in a different source from that which employed Jacob Dahse has called attention to the fact

that interpolations and additions are likely to occur at the end of pericopes, and this is an important consideration, even if the annual and triennial sections are too late to furnish a clew to the earlier booklets, and Wiener has emphasized the need of separating the accretions and taking note of the marked changes the text has undergone in the course of its transmission These investigations seem to point the way to a new theory as to the origin and growth of Genesis as well as the rest of the Pentateuch

Archæological discoveries in western Asia have in recent times brought us into more direct contact with the social life and the world of thought in which the stories recorded in Genesis are likely to have developed There is no room for doubt that the accounts of creation, the first man (see ADAM), the tree of life (see EDEN), the antediluvian patriarchs, the deluge (q v), and the tower (see BABEL, TOWER OF) were derived from Babylonian stories, ultimately of Sumerian origin But while it was at first thought that familiarity with these would not be possible in Palestine before the invasions of Assyrian armies, or even before the settlement of Jewish exiles in Babylonia after 586 B C, it is now known that Babylonian myths had traveled as far as into Egypt in the fourteenth century B C (see ADAPA), and many scholars regard it as probable that they were already told among the Amorites (q v) long before the immigration of Hebrew tribes into Syria, which may have begun in the fifteenth century B C (See JEWS, TEL EL-AMARNA TABLETS) There is, indeed, nothing that forbids the assumption that in their original form they were committed to writing by the Hebrews as soon as they became acquainted with the Semitic alphabet. (See ALPHABET) In view of the cuneiform tablets found in Syria it is not even inconceivable that some Hebrews may have known this system of writing and thus had a means of learning something of Babylonian lore which had found its way into the land of the Amorites But of this there is as yet no evidence. It should be observed that some scholars, notably Gunkel and Gressmann, who maintain the current documentary hypothesis and the dates usually assigned to the sources, are quite ready to admit that these Babylonian myths may have been known in Palestine and among the Hebrews centuries before they were given their present form by the supposed Judæan and Israelitish writers The patriarchal stories clearly have their home in the Negeb (q v). They were first told concerning the heroes of Hebron, Beersheba, Beerlahairoi (Ain el Muwelih), and probably the southern Bethel (Halasa) Even Jacob lived in "the vale of Hebron" (Gen xxxvii 14). As these stories spread to the north, they naturally received here and there an Israelitish setting How early the Negeb heroes were connected with Babylonia and Mesopotamia on the one hand, and Egypt on the other, is not easily determined It has been maintained that the term "Ur of the Chaldees" was possible only in the time of the Chaldæan Empire (625–539 B C.), but it is not improbable that the city of Ur was largely inhabited by Chaldæans already in the Kassite period, and some of the succeeding dynasties on the throne of Babylon may have been Chaldæan (See BABYLONIA.) It is not the Aramæans of Damascus, but those of Mesopotamia, who flourished at an earlier period, that figure in the amplified story of Abraham, Isaac, and Jacob Steindorff and Lagarde attempted to prove that such Egyptian names as those in Gen xli 45—Zaphenath-paneah, Asenath, and Potiphera—as well as the designation of Pharaoh, did not become common before the twenty-sixth dynasty, and that consequently the Elohist could not have written before the middle of the seventh century, and it has been widely held that these names are due to a reviser of the document As names of this type are rarer in earlier days, and some of them tend to disappear later, it is not impossible that they are interpolations made at this time, but such names occur sporadically at least as early as the twenty-second dynasty, and familiarity with Egyptian names is not improbable in Syria in the age of Solomon and Rehoboam An important observation, bearing on the age of the stories in Genesis, has been made by Soderblom (*Gudstrons uppkomst*, Stockholm, 1914) He calls attention to the striking contrast between the conception of the divinity that prevails in Genesis and that of Yahwe in the story of Moses Whatever the name may be, El, El olam, El Bethel, El shaddai, El elyon, Elohim, or (in our present text) Yahwe, there is a marked distinction in character between him and the terror-inspiring, jealous god of Sinai, whom Soderblom regards as an animistic divinity, while the deity in Genesis reminds him more of the originators, or creators, of primitive peoples (See CREATION) It would certainly be strange if these stories were written down, in the days of Elijah or Isaiah, by the same men who related the awful dealings of the god proclaimed by Moses This also seems to militate against the theory of a Mosaic authorship Besides, the patriarchal narratives reveal an acquaintance with Palestine, its many sanctuaries, and the often divergent etymologies of their names which many students regard as an evidence that they were written there, and not by one who according to tradition never was in that country, and they give the impression of having been written originally in Hebrew, and not in Egyptian hieroglyphics or Babylonian cuneiform writing, such as might have been known to an Egyptian in the fifteenth century B C, and, so far as we now know, Hebrew was never written with the wedge-shaped signs

As to the historical value of Genesis, there is much difference of opinion The obvious fact that even the earlier stories show a remarkable suppression of mythical elements characteristic of the Babylonian originals is still interpreted by some as evidence of a primitive tradition preserved in relative purity among the Hebrews, while it has been overlaid with polytheistic, mythical, and superstitious features in the pagan narratives Most Protestant scholars, however, seek to account for the difference by the gradual growth of monolatry and monotheism in Israel and no longer attempt to harmonize the stories in the first part of Genesis, which they regard as of mythical origin, with the results of modern scientific and historical investigation On the other hand, there are not a few scholars who consider Abraham an historic personality and are inclined to look for a kernel of facts in the stories of Jacob (q.v.) and Joseph (q v), while others regard these patriarchs in the same light as the long-lived antediluvians Future discoveries, especially in connection with Gen. xiv (see ABRAHAM, AMRAPHEL, HAMMURAPI), may throw light upon this question so far as Abraham is concerned.

Bibliography Of the numerous commentaries on Genesis the more recent are those of Delitzsch (1887), Dillmann (1892), Hummelauer (1895), Ball (1896), Strack (1897), Holzinger (1898), Driver (1906), Minocchi (1908), Mitchel (1909), Skinner (1910), Gunkel (1910), Ryle (1914) Among the introductions to the Old Testament the following, written from different points of view, should especially be consulted viz, those of Richard Simon, Carpzov, Eichhorn, De Wette, Havernick, Herbst-Welte, Kuenen, Keil, Vatke, Bleek-Wellhausen, Cornill, Driver, Baudissin, Sellin, Ubaldi, Cornely, and Kaulen Special introductions to the Hexateuch have been written by Westphal, Holzinger, and Carpenter-Battersby Consult also Hobbes, *Leviathan* (London, 1651), Spinoza, *Tractatus theologico-politicus* (Hamburg, 1670), Le Clerc, *Sentimens de quelques théologiens de Hollande* (Rotterdam, 1685), id, *Commentarius in Pentateuchum* (Amsterdam, 1693), Astruc, *Conjectures sur les mémoires originaux dont il paraît que Moïse s'est servi pour composer la Genèse* (Paris, 1753), Ilgen, *Urkunden des jerusalemischen Tempelarchivs* (Halle, 1798), Tuch, *Commentar uber die Genesis* (ib, 1838), Hengstenberg, *Die Authentie des Pentateuchs* (Berlin, 1836–39), Welte, *Nach-Mosaisches im Pentateuch* (Tubingen, 1841), Hupfeld, *Die Quellen der Genesis* (Berlin, 1853), Knabenbauer, "Der Pentateuch und die unglaubige Kritik," in *Stimmen aus Maria Laach* (Freiburg, 1873), Lamy, *Commentatio in Genesin* (Mechlin, 1883), Budde, *Die biblische Urgeschichte* (Giessen, 1883), Lagarde, *Mitteilungen*, iii, pp 226 ff (Gottingen, 1889), Bacon, *The Genesis of Genesis* (New York, 1892), Halévy, *Récherches bibliques* (Paris, 1895), Green, *The Unity of the Book of Genesis* (New York, 1896), Spurrell, *Notes on the Text of the Book of Genesis* (ib, 1896), Gunkel, *The Legends of Genesis* (Chicago, 1901), Ehrlich, *Randglossen zur hebraischen Bibel I* (Berlin, 1908), Eerdmans, *Alttestamentliche Studien* (ib, 1908), Wiener, *Pentateuchal Studies* (Oberlin, 1912), Dahse, *Textkritische Materialien zur Hexateuchfrage* (Leipzig, 1912), Gressmann, *Mose und seine Zeit* (ib, 1912), N. Schmidt, in *Journal of Biblical Literature*, xxxiii (New York, 1914), Jastrow, *Hebrew and Babylonian Traditions* (ib, 1914)

GENET, jĕn'ĕt, or **GENETTE** (Fr *genette*, from Sp. *gineta*, from Ar *jarnait*, genet) One of several species of small animals forming the genus *Genetta* of the family Viverridæ, and nearly allied to the true civets (q v), but having only a rudimentary odoriferous pouch, and claws perfectly retractile, as in the cats The approximation to that family also appears in the vertical contraction of the pupil of the eye The species are numerous, smaller and more slender animals than the civets, mostly natives of Africa and southwestern Asia One, the common genet (*Genetta genetta*, or *vulgaris*), is found in the south of Europe, western Asia, and northern Africa, and is divisible into several subspecific forms It is gray, with small round or oblong black or brown spots, the tail, which is as long as the body, ringed with black and white It frequents the banks of brooks Its fur is a considerable article of commerce It is easily domesticated and is kept in houses in Constantinople to catch mice Of the other species two are South and East African, and one is restricted to West Central Africa

The genet is sometimes met with in heraldry There was an order of knighthood in France, which was said to have been founded by Charles Martel, called the Order of the Genet, but it has long ceased to exist

GENÊT, or **GENEST,** zhe-nĕ', Edmond Charles Edouard (called "Citizen Genêt") (1765–1834) A French diplomat, born at Versailles His father, Edme-Jacques (died 1781) was the chief of the Bureau of Correspondence of the Department of Foreign Affairs, and the youth, with the rank of captain of dragoons, was attached to the bureau as interpreter in 1775 The son developed remarkable powers as a linguist, and at the age of 12 translated from the Swedish into French the *Histoire d'Eric XIV, roi de Suède* (1777) and *Recherches sur l'ancien peuple finnois* (1778) In 1779 and 1780 he was successively attached to the French embassies at Berlin and Vienna and in 1781 succeeded his father in the Department of Foreign Affairs In 1788 he accompanied the Comte de Ségur to St Petersburg, as Secretary of the French Embassy, remaining in charge after Ségur's retirement until 1792, when he was given his passports at the demand of the Empress Catharine II In Paris Genêt allied himself to the Girondists, and in November, 1792, was named Ambassador to Holland, whence he was transferred in the following spring as "Minister Plenipotentiary to the Congress of the United States" Before it was decided to execute King Louis, Thomas Paine suggested that he be sent to the United States, and Lebrun that Genêt escort him thither His actual mission was to induce the United States to declare war against Great Britain, and he came with the intention not only of accomplishing that purpose, but of raising a volunteer army to regain Louisiana from Spain and of commissioning privateers in American ports. He landed at Charleston, S C April 8, 1793 He was enthusiastically welcomed and fêted at Charleston and Philadelphia, and, encouraged by the expressions of sympathy and friendship for France which he heard on all sides, he began to commission privateers and seek recruiting agents He planned expeditions against East Florida from Georgia, against Louisiana from the Carolinas, and against New Orleans from Kentucky, the last to be led by George Rogers Clark Washington, by the unanimous advice of his cabinet, had issued a proclamation of neutrality on April 22, and on June 5 Jefferson, the Secretary of State, notified the French envoy that he must cease arming and equipping privateers in American ports Genêt replied that he was acting under the treaties of 1778 and continued to disregard Jefferson's warning In the next few months eight privateers, commissioned by him, had, with the assistance of two French frigates, captured 50 British merchantmen, some of which had been taken within the jurisdiction of the United States Genêt asserted that these prizes could be condemned by French consuls in American ports, demanded the right to enter the condemned goods duty free, and declared that the United States Constitution did not give Washington the right to treat with him and made the demand that an extra session of Congress be called for that purpose His criticisms and attacks upon Washington, and the continuance of his activities in fitting out privateers and raising recruits, lost him most of the allies he had at first possessed, and the arrest of two of his agents

and the expulsion of the French Consul at Boston were followed by a demand for his own recall, which was acceded to by the French government in the following year In December, 1793, he published his instructions. *Genêt and the Federal Government* The fate of his fellow Girondists warned Genêt not to return to France, and he became a naturalized American citizen, settling in New York, where he married a daughter of Gov George Clinton, whose campaign for the presidency in 1808 he favored in *Communications on the Next Election . by a Citizen of New York* (1808) Consult Turner, 'Genêt's Projected Attack on Louisiana and the Floridas," in *American Historical Review*, vol. iii (New York, 1898), and his "Policy of France toward the Mississippi Valley," in the same *Review*, vol x (1905)

GENETH'LIAL/OGY (Gk γενεθλιαλογία, *genethlialogia*, casting of nativities, from γενέθλη, *genethlē*, birthday, from γίγνεσθαι, *gignesthai*, to be born + -λογία, *-logia*, account, from λέγειν, *legein*, to say) A term sometimes used to describe astrology as used in calculating nativities or predicting future occurrences from the stars that preside at the birth of persons See ASTROLOGY DIVINATION

GENET'IC PSYCHOL/OGY (from Gk γένεσις, *genesis*, origin, from γίγνεσθαι, *gignesthai*, to be born) Under this head are included all those branches of psychology which treat of the growth or development of mind, individual or social Hence, like experimental psychology (q v), it is rather psychology as viewed from a particular standpoint than a particular department of general psychology It is customary to bracket together animal and child psychology (qq v) under the genetic heading, but while the child mind may be investigated as the immediate, and the animal mind as the more remote, source of origin of the adult human mind, both the animal and the child may also be examined for themselves, without overt regard to their place in the evolutionary series. Ethnopsychology and social psychology, in the same way, may be treated either statically or genetically, though, as a rule (especially in the discussion of the great mental products, myth, language, and custom), the genetic method is followed.

Modern science is so thoroughly dominated by the evolutionary idea that it may seem, at first thought, as if a scientific psychology must necessarily be genetic And this is true, in the sense that the psychologist, in whatever field he may be working, must never forget the organic character of mind, the fact that our present consciousnesses are what they are by reason of the past history of the organism as well as of current stimuli Even when we attempt to analyze so apparently simple a process as perception, we are invariably referred to genesis for the explanation of certain of its features At the same time it would be impossible to-day to write a satisfactory genetic psychology, in the full meaning of the term For (1) the most assured results of mental science lie in the domain of analysis, not of genesis. When we think of the development of mind, we think instinctively of the development of mental function Now, a psychology of function tends to become a merely classificatory psychology (see FACULTY); and the writers who have escaped this tendency are not in agreement among themselves, some making will, and some feeling, and some an intellectual process, the root function of mind It follows that the works on genetic psychology have a distinct personal flavor, it is as natural to speak of "Spencer's psychology" as it is unnatural to speak of "Kelvin's physics" or 'Liebig's chemistry" Again, (2) while the belief is practically universal among psychologists that the human mind is in some sort continuous with the rudimentary consciousness of primitive organisms, it is still very difficult to envisage the course of development, to imagine what the primitive mind was and how—by what steps or stages, by what mechanism—it has developed Some investigators (e g, Romanes) write as if there were a simple superposition of function on function, faculty on faculty, others (e g, Baldwin) give us rather a development of a motor than of a mental organism, others offer descriptions of special consciousnesses at various levels of development, without asking how the earlier become transformed and differentiated into the later

A genetic psychology is, therefore, not so much an accomplished fact as the conscious and necessary ideal of psychological inquiry, itself the final term of a psychological development Meanwhile there are, as we have just indicated, a number of concrete genetic psychologies, some of which rest upon a psychological basis, others upon a physiological, or an anatomical, or an anthropological basis We may, e g, mark off periods in the growth of mind by changes in mental capacity—development of the senses, of speech, of emotional activity, of power of attention, etc , or by the functional activities of various organs, or by stages of physical growth, or by the successive appearance of racial characteristics This last principle of division implies a similarity between racial evolution and individual development, which is summed up in the "recapitulation theory" The theory posits a parallelism, physical and mental, between the epochs through which the race has passed from primitive to civilized man, on the one hand, and the growth of the individual on the other One phase of recapitulation has been adopted by the Herbartians in their theory of "culture epochs" They contend that the individual passes through the same stages of culture that the race has traversed The theory seems to hold only when it is taken broadly The 'young savage" in the child is strikingly apparent at times, and his passion for hunting, fishing, roving, and his intolerance of restraint are strong reminders of lower grades of culture But there are many unlike factors in the environment of the child and the savage The race wrought its own culture, the child has its culture thrust upon it It lives in a social and moral forcing house, from which a primitive race is exempt, except in so far as it comes into contact with more civilized peoples. These differences, together with the physical immaturity of the child, can but cut across and modify "recapitulation" And yet this may be clearly traced in certain general tendencies of the child, e g, in the use of gesture language, in word inventions and onomatopœia, in rhythmic movements, in the character of his drawings, and in his æsthetic preferences. We should, however, find similar resemblances between the child of civilization and the child of primitive culture The two seem to differ chiefly in the shorter period of infancy and adolescence which is allotted to the primitive child. So that we are led to a fact which is perhaps more important than the alleged recapitulation—the fact

that childhood differs comparatively little between one level of culture and another, whereas the mental status of the adult varies materially

But not only does the evolutionary study of the child mind hint at the parallelism of individual and racial development, it intimates that the child often "harks back" to experiences of his animal progenitors Many of his emotions, as fear and anger, his instinctive and impulsive actions, his vegetarian propensities, habits of scratching, biting, clawing, teasing, his cruelty, many of his games and plays, have been instanced as showing atavistic tendencies In this matter, again, the *via media* is the only safe way Many so-called atavisms are simply analogies, some of them poor analogies, whose real explanation is to be found within the experience of the individual himself We grant that the experience of the human young has many points in common with the experience of certain of the lower animals, but the question is whether the likeness is not usually coincidental Take, e g, the cruelty of the child It is due largely to a failure to appreciate the significance of pain, while in the savage it is the natural result (where it really exists) of a hard struggle for survival

A like criticism must be passed upon other current attempts to work out a genetic psychology, in the concrete, upon some special basis, their generalizations are limited in scope and uncertain in application Such psychologies must, at the best, be classificatory or explanatory rather than descriptive, and it may be doubted whether they can ever furnish material aid to that ideal genetic psychology of which we spoke earlier in this article

Consult Darwin, *Descent of Man* (New York, 1906), Baldwin, *Mental Development in the Child and the Race* (ib, 1906), Spencer, *Principles of Psychology* (ib, 1890), Romanes, *Mental Evolution in Animals* (London, 1885), id, *Mental Evolution in Man* (ib, 1888), Hall, *Adolescence* (New York, 1905), Kirkpatrick, *Genetic Psychology* (London, 1910), Partridge, *The Genetic Psychology of Education* (New York, 1912).

GENEVA. See GIN

GENE'VA. The southwesternmost canton of Switzerland, bounded by the Canton of Vaud and Lake Geneva on the north, and by France on the east, south, and west (Map Switzerland, A 2) Area, 108 square miles The surface consists of low hills, watered chiefly by the Rhône The soil is not naturally fruitful, but the careful industry of the inhabitants has rendered over 81 5 per cent of the total area of the canton productive Grain, wine, fruits, and vegetables are produced in considerable quantities, and domestic animals are raised Industrially Geneva is one of the leading cantons of Switzerland and is famous for its watch-manufacturing industry, which was introduced from France as early as 1587. The manufacture of music boxes and jewelry was begun later, and at present the products of the canton include machines, mathematical instruments, and electric apparatus. Large manufacturing establishments which utilize the power of the Rhône have materially changed the character of the industries and increased the total value of the output The number of factories subject to federal inspection in 1911 was 519, employing 13,433 workers. The silk industry, formerly of great importance, is now in a state of decline. The commerce is greatly facilitated by the proximity to France, and the products of Geneva, especially watches, are exported to all parts of the world Budget receipts in 1910 were 11,730,000 francs, in which year expenditures amounted to 11,634,000 francs

The constitution of the canton, first adopted in 1847 and repeatedly modified, provides for a true democratic form of government The legislative power is vested in the Grosser Rat, consisting of 100 elected members, the executive power, in a Council of State of 7 elected members The referendum was introduced in 1880 Besides a number of higher and inferior courts, Geneva has also arbitration courts for the settlement of industrial disputes Pop, 1900, 132,609, 1911, 156,288 Nearly one-third of the population is of foreign birth, chiefly French and Italian The inhabitants are divided about equally between Roman Catholic and Protestants, about 30 per cent being foreigners and nearly 90 per cent speaking French Capital, Geneva (q v)

GENEVA The capital of a canton of the same name, Switzerland, situated at the southwest extremity of the Lake of Geneva, at the outlet of the river Rhône, which divides the city into two equal parts (Map Switzerland, A 2) It is magnificently situated, in full view of the Alps (including Mont Blanc) and the Jura The old city, on the left bank of the river, constitutes the business and financial quarter and is irregularly laid out, with steep, crooked streets, except for the portion along the river, which has fine quays and broad avenues On this side of the river is the section of the city called Eaux Vives Several bridges span the Rhône, one of which rests upon an islet called Rousseau's Island On the right bank is the Quarter of Saint-Gervais, which is chiefly residential, containing a great part of the laboring population Here are also hotels for the accommodation of foreigners, who form a considerable colony in Geneva There are numerous squares, parks, and gardens, most of them in the old city The most notable are the Jardin Anglais, or Promenade du Lac, along the lake shore, and the Place Neuve, with the Promenade des Bastions, leading southward to the botanical gardens The most important square in the Saint-Gervais Quarter is the Place des Alpes, with a magnificent memorial cenotaph of the Duke Charles II of Brunswick, who left his fortune of $4,000,000 to the city Boulevards laid out on the site of the ancient walls extend around the city The principal buildings are the Romanesque cathedral of St Peter, built in the eleventh century, the sixteenth-century town hall, with the house near by in which Rousseau was born, the university (see GENEVA, UNIVERSITY OF), the Musée Fol, with archæological collections, and the Musee Rath, an immense art collection given by the Russian General Rath to the city Also noteworthy are the Anglican and American Episcopal churches and the new theatre Besides the university, Geneva has the Collège de Genève, founded by Calvin in 1559, various industrial technical, and commercial schools, academies of art and music, a deaf and dumb institute, and a municipal library with about 200,000 volumes There are many learned and art associations, notably the Natural Science Association, the Geographical Society, and the Society of Artists

Geneva has long been known as a manufacturing city and especially as a clock, watch, and

jewelry making centre Besides these industries the most important are enameling, diamond cutting, and the production of music boxes and scientific instruments There are also iron and chemical works The town enjoys a favorable position for trade with France and the Mediterranean shore, exporting its own manufactures and those of the surrounding districts A large part of the area surrounding the city is a 'free zone," into which material for use in manufacturing for exportation may be introduced duty free It is the seat of a United States consul The town is a railroad centre and is traversed by horse-car lines and steam suburban railroads The municipality's progressiveness has been particularly marked since 1847 by radical improvements throughout the city Breakwaters, protecting the lake harbor, hydraulic works in the Rhône, supplying the city with water and furnishing power for factories, and gas, electric-lighting, and power plants are owned by the city Pop, 1888, 52,043, 1900, 105,710, 1910, 125,520

At the time of Cæsar's campaign against the Helvetii Geneva belonged to the country of the Allobroges It was afterward included in the Roman Provincia Maxima Sequanorum and was a place of some importance under the Burgundian kings In the year 534 it came under the rule of the Franks and towards the close of the ninth century became part of the new Kingdom of Transjurane Burgundy It had been made a bishop's seat in the fifth century, and from the twelfth century continual feuds arose between the bishops and the counts of Savoy with regard to supremacy In 1032 Conrad II of Germany got possession of the town and put a bishop in charge of it In 1531 the Genevese renewed their alliance with Fribourg and Bern, and thus Geneva became a member of the Swiss Confederation The doctrines of the Reformation, boldly and enthusiastically preached by Guillaume Farel, a Frenchman, met with general acceptance in Geneva In conjunction with Bern the citizens expelled the adherents of the dukes of Savoy from the town and declared the bishopric vacant In August, 1535, the Reformed religion was established by law, and in 1541 Calvin was invited to take up his residence permanently in Geneva as public teacher of theology It was he who chiefly impressed the stamp of rigid morality, not unalloyed with pedantry, on the minds of the citizens of Geneva and awakened a taste for the exact sciences The town, which had hitherto been merely a place of trade, thus acquired an important influence over the spiritual life of Europe and became the centre of education for the Protestant youth of Great Britain, France, Germany, and Spain In 1602 the last attempt of the dukes of Savoy to recover the town was frustrated by the energy and resolution of the citizens During the eighteenth century Geneva was distracted by a continued feud between the aristocratic and popular parties, until in 1782 Bern, Sardinia, and, in particular, France interfered in favor of the aristocracy The French Revolution led to a new crisis, the government was overthrown in July, 1794, equality in the eye of the law was established, a national convention appointed, and a reign of terror commenced In 1798 Geneva with its territory was annexed to France, under the name of the Département du Léman After the overthrow of Napoleon Geneva recovered its independence, and the Congress of Vienna increased its territory considerably and guaranteed its neutrality From 1841 to 1878 its history was one of political struggles between clerical, conservative, radical, and independent factions, which resulted in the separation of church and state and the triumph of the progressive parties In 1879 the Referendum was introduced and in 1891 the Initiative and Recall In 1907, by a referendum, the church and state were separated The most important event in the history of the town since 1907 was the purchase, on March 23, 1912, by the Canton of Geneva of the main railway station from its French owners, the Paris, Lyons, and Mediterranean Railway Company Consult Pictet de Sergy, *Genève, origine, etc* (Geneva, 1843–47), and *Geneve ressuscitee* (ib, 1869), Cherbuliez, *Geneve, ses institutions, etc* (ib, 1868), Galiffe, *Genève historique et archeologique* (ib, 1869), Blavignac, *Etudes sur Genève* (ib, 1872–74), Boissonnas, *Genève à travers les siecles* (ib, 1900), Chapuisat, *La municipalite de Geneve pendant la domination française 1798–1814* (2 vols, ib 1910)

GENEVA. A city and the county seat of Kane Co, Ill, 38 miles west of Chicago, on the Fox River, and on the Chicago and Northwestern Railroad (Map Illinois, H 2) It is popular as a residential place for Chicago business men, has a public library and one of the finest courthouses in Illinois, and is the seat of the State Reformatory for Female Juvenile Offenders There are manufactures of windmills, sadirons, boxes, flour, candy, shoes sanitary cups, and hardware It is also a milk and butter centre Settled about 1833, Geneva was incorporated in 1835 as a village and as a city in 1887 The water works and electric-light plant are owned and operated by the municipality Pop, 1900, 2446, 1910, 2541

GENEVA A city and the county seat of Fillmore Co, Neb, 54 miles (direct) west by south of Lincoln on the Burlington and Missouri River and the Chicago and Northwestern railroads (Map Nebraska, G 4) It is the seat of the State Industrial School for Girls and contains a Carnegie library The principal industries are farming, brickmaking, and stock raising A large nursery is situated here Geneva owns its water works Pop, 1900, 1534 1910, 1741

GENEVA. A city in Ontario Co, N. Y, 51 miles southeast of Rochester, on Seneca Lake, the Seneca and Cayuga Canal, and the New York Central and Hudson River and the Lehigh Valley railroads (Map New York, C 5) It commands a magnificent view of the lake and surrounding country and is the seat of Hobart College (Protestant Episcopal, opened in 1822), a college for girls, and of the State Agricultural Experiment Station It contains also a city hospital. The city is noted for its extensive nurseries and has manufactures of stoves, steam boilers, motors and motor boats, optical supplies, cereals, canned goods, wagons, cutlery, glass bottles, etc Geneva was chartered as a city in 1898 and is governed by a mayor, chosen every two years, who controls appointments to most of the municipal offices, and a unicameral council The city owns and operates its water works Near Geneva stood the Indian village, Kanadesaga, destroyed by Gen James Clinton in 1779 Pop, 1900, 10,433, 1910, 12,446, 1914 (U. S. est), 13,303, 1920, 14,648.

GENEVA (from OF *genevre*, Fr *genièvre*, It *ginepro*, juniper, from Lat *juniperus*, juniper, corrupted by popular etymology with *Geneva*, a city of Switzerland) One of the names of the juniper berry, but also often applied to the spirit distilled from grain and flavored with juniper berries and manufactured in Holland and hence called Hollands or Holland gin The word "gin" is itself a corruption of "Geneva"

GENEVA, LAKE (Fr *Lac Léman*, the *Lacus Lemannus* of the Romans) A crescent-shaped lake, the largest in Switzerland, extending around the northern part of the Department of Haute-Savoie, France, and with its west, north, and east shores bordering the Swiss cantons of Geneva, Vaud, and Valais (Map Switzerland, A 2) It has an area of 224 square miles It is 45 miles long and attains a maximum breadth of 8½ miles between Morges and Amphion, its greatest depth is 1015 feet, between Evian and Ouchy At the Strait of Promenthoux, 2 miles wide, it is divided into the Great Lake, about 39 miles long, with an average breadth of 6 miles, and the Little Lake, 6 miles long and 2 miles broad The river Rhône, turbid and yellow, enters the lake at the northeastern end and leaves it at the southwest, through the city of Geneva, perfectly clear and of a deep-blue tint The deposits of this river at the northeast end have contracted considerably the area of the lake, former towns and villages on its shores in some cases now being miles inland About 20 other streams, all insignificant, flow into the lake, which is 1230 feet above the sea, with the melting of the mountain snow in summer the lake rises from 6 to 8 feet above its usual level It is subject to the phenomena known as *seiches*, caused probably by local alterations in the atmospheric pressure, which frequently occasion a rise and fall of from 2 to 5 feet in the course of half an hour The *seiches longitudinales* traverse the lake from one end to the other, the highest on record being over 6 feet high, the *seiches transversales* cross from the Swiss to the French side in 10 minutes The lake is never entirely frozen over It abounds in trout, lake salmon, perch, pike, and carp

The beauties of Lake Geneva have been celebrated for centuries and annually attract thousands of tourists, its shores have been favorite residential resorts of numerous celebrities The shore on the side of the Pays de Vaud is celebrated for the magnificence of its scenery, the southern French shore rises solemn and stern, with the mountains of Savoy in the background From the Lake of Geneva Mont Blanc is visible, and, although 40 miles distant, is often reflected in its intensely blue waters. The principal places on Lake Geneva are Geneva, Coppet, Nyon, Morges, Lausanne (with its port, Ouchy), Vevay, Montreux, Evian-les-Bains, and Thonon Consult Lewis and Gribble, *The Lake of Geneva* (London, 1909)

GENEVA, UNIVERSITY OF A Swiss university, known under its present name only since 1873, but the outgrowth of one of the oldest and most famous of Protestant institutions of learning, the Academy of Geneva, founded by the Genevan Republic in 1559 The academy had the usual faculties of philosophy, science, law, and theology, but the last named, under the direct oversight of Calvin and Beza, was the most renowned The institution soon became the leading resort of Protestant scholars and students of all nations and lent much lustre to a city already famous for its curious theocratic republican form of government After the Huguenot persecutions Geneva became more than ever the centre of French Protestant culture and influence, a characteristic maintained throughout the eighteenth century The names of Scaliger, Casaubon, De Saussure, and De Candolle have given the university distinction It is still a place of educational importance It was attended in 1913 by 1669 students, many of them from abroad, who were mainly in the faculties of medicine and philosophy Women are admitted on the same conditions as men Consult C Borgeaud, *Histoire de l'Université de Genève* (2 vols, Geneva, 1909)

GENEVA ARBITRATION The international adjudication of the controversies between the United States and Great Britain growing out of the depredations of the *Alabama* and other Confederate cruisers upon the commerce of the former country during the Civil War The arbitration tribunal was instituted as the result of the Treaty of Washington, signed February, 1871, by the joint commission which had met at Washington to settle those controversies For the nature of the differences thus adjudicated and the constitution of the tribunal and the results of the arbitration, see ARBITRATION, INTERNATIONAL, ALABAMA CLAIMS

GENEVA BIBLE See BIBLE

GENEVA CATECHISMS A smaller and a larger French catechism by Calvin, published in 1536 and 1541, the second of which was afterward translated and adopted as the formulary of the Reformed churches of Switzerland, France, and Hungary

GENEVA CONVENTION An agreement concluded at an international conference which was held at Geneva, 1864, under the presidency of General Dufour, the Swiss Plenipotentiary, for the purpose of ameliorating the condition of the sick and wounded in time of war The credit of originating this conference belongs to two citizens of Geneva—Dunnant, a physician, who published a startling account of what he had witnessed in two military hospitals on the field of Solferino, and his friend Moynier, chairman of the Society of Public Utility, who took up the idea of "neutralizing the sick wagons," formed associations for its agitation, and at length pressed it upon the governments of Europe, most of which sent representatives to the conference The convention was drawn up and signed by them on August 22, and since then it has received the adherence of every European power, the United States, and several Latin American and Asiatic countries The convention consists of 10 articles, which provide (1) for the neutrality of ambulances and military hospitals as long as they contain any sick, (2) for that of the staff, (3) that the neutrality of these persons shall continue after occupation of their hospitals by the enemy, so that they may stay or depart, as they choose; (4) that if they depart, they can only take their private property with them except in case of ambulances, which they may remove entire, (5) that a sick soldier in a house shall be counted a protection to it and entitle its occupants to exemption from the quartering of troops and from part of the war requisitions, (6) that wounded men shall, when cured, be sent back to their own country on condition of not bearing arms during the rest of the war,

(7) that hospitals and ambulances shall carry, in addition to the flag of their nation, a distinctive and uniform flag bearing a red cross on a white ground, and that their staff shall wear an arm badge of the same colors, (8) that the details shall be left to the commanders

A second conference was held at Geneva on the same subject in 1868 and a supplementary convention drawn up It consists partly of interpretations of the former convention and partly of an application of its principles to maritime wars Its main provisions are these That when a person engaged in an ambulance or hospital occupied by the enemy desires to depart, the commander in chief shall fix the time for his departure, and when he desires to remain, that he be paid his full salary, that account shall be taken in exacting war requisitions not only of the actual lodging of wounded men, but of any display of charity towards them, that the rule which permits cured soldiers to return home on condition of not serving again shall not apply to officers, for their knowledge might be useful, that hospital ships, merchantmen having wounded on board, and boats picking up wounded and wrecked men shall be neutral, that they shall carry the red-cross flag, and their men the red-cross armlet, that hospital ships belonging to the government shall be painted white with a green strake, those of aid societies white with a red strake that in naval wars any strong presumption that the convention is being abused by one of the belligerents shall give the other the right of suspending it towards that power till the contrary is proved, and, if the presumption becomes a certainty, of suspending it to the end of the war See RED CROSS SOCIETIES, WAR

GENEVA GOWN. See COSTUME, ECCLESIASTICAL

GENEVIEVE, jĕn'e-vēv' The heroine of a poem by Coleridge, which is sometimes known by the same name, but more frequently by that of "Love" It was added to the second edition of the *Lyrical Ballads* (1800)

GENEVIÈVE, zhĕn'vyăv', SAINT (Lat *Genovefa*) (c 422–512) The patron saint of Paris and the subject of many popular and highly poetical legends She was born in 419 or 422, in the village of Nanterre, near Paris, where, as a mere child, she attracted the notice of St Germanus of Auxerre (q v.), who passed a night at Nanterre on his way to Britain (c 430) and who is said to have marked her out as specially destined to a life of holiness and purity She devoted herself to a life of virginity and conventual seclusion On the death of her parents she removed to Paris, and her active charity, and the extraordinary reputation for sanctity which she acquired, both there and in other cities of France which she visited on missions of Christian benevolence, won for her the admiring veneration, not alone of her own people, but even of the heathen or half converted The Frankish rulers Childeric and Clovis set prisoners free at her intercession When (c 450) it was proposed to abandon Paris in alarm at the approach of Attila and the Huns, Geneviève, assembling the matrons and consecrated virgins in one of the churches, exhorted them to avert, by prayer and fasting, the threatened calamity The unexpected alteration of Attila's march towards Orléans, leaving Paris untouched, added still more to her reputation and to her influence. Later, when Clovis besieged the city, Geneviève, with her sisters in religion, set out on an expedition for the relief of the starving people and successfully conveyed to Paris a supply of provisions After his conversion the city opened its gates to him by her advice (497) She died in Paris, Jan 3, 512 Under her patronage and with her name a religious congregation of priests—The Canons of St Geneviève—was founded in the eleventh century, which with some vicissitudes continued until the Revolution (1789) A religious congregation of women, under the name of Sisters of St Geneviève, was established in 1636 for the purpose of caring for the sick and the education of girls An edifice built in her honor and upon the supposed site of her tomb in 1764–90, which is now called the Pantheon, contains the famous mural painting of the saint by Puvis de Chavannes Adjoining is the Library of St Genevieve, containing 200,000 volumes, and near by is a relic of the abbey of St Geneviève Her day is January 3 Consult her life by Delalain (Paris, 1872), Vidieu (ib, 1884), and Lesetre (ib, 1899)

GENEVIÈVE DE BRABANT, de brä'bän' According to the legend, daughter of a duke of Brabant, and wife of Siegfried, Count Palatine of Treves in the first half of the eighth century During Siegfried's absence with Charles Martel against the Saracens, she was criminally solicited by Golo, a knight in whose charge her husband had left her When he returned, finding that his wife had given birth to a child (which in reality was his own), he ordered both mother and child to be killed But their lives were preserved, and many years later the repentant Siegfried found them out and acknowledged the injustice of his suspicions Consult Sauerborn *Geschichte der Pfalzgrafin Genoveva und der Kapelle Frauenkirchen* (Regensburg, 1856), and Golz, *Pfalzgrafin Genovefa in der deutschen Dichtung* (Leipzig, 1897)

GENGA, jĕn'ga, GIROLAMO (c 1476–1551) An Italian painter, architect, and sculptor, born at Urbino He received instruction from Luca Signorelli, whom he assisted in the frescoes in the chapel of the Virgin at Orvieto, and afterward became the pupil of Perugino, in whose company he met Raphael The frescoes he painted in the Petrucci Palace at Siena (1508) are destroyed except the two preserved in the Accademia of Siena, representing "Æneas and Anchises" and "Escape of Prisoners" Four years afterward he went to Urbino and did some decorations at the command of the Duke Guidobaldo II Soon after this he went to Rome, where he executed what is probably his best picture, "The Resurrection," in the church of St Catharine of Siena Recalled to Urbino, he worked for the Duke, in company with Timoteo Viti, and after his patron's deposition went with him to Cesena, and returned with him in triumph to Urbino From that time on his work was architectural He restored the palace of Castel Durante at Urbino and built Monte Imperiale near Pesaro, the church of San Giovanni Battista at Pesaro, the Bishop's Palace at Sinigaglia, and the cloister of the Zoccolanti at Monte Baroccio. In painting Genga was an eclectic, influenced by many masters—Viti, Raphael, and Sodoma, besides the teachers mentioned.

GENGHIS, JENGHIS, or **ZINGIS KHAN,** jĕn'gĭs kan (1162–1227). A celebrated conqueror, originally known as Temujin (after a

great Tatar chief), the title "Genghis Khan" merely signifying 'Great Khan' or 'Ruler' He was born at Deylun Yeldak, near the northern bend of the Hoang-ho, in Mongolia, being the son of Yesuka Bahadur, a Mongol chief who ruled over the tribe of Neyrun, dwelling between the Amur and the Great Wall of China, and paying tribute to the Khan of East Tartary On his father's death Temujin assumed the reins of government, though only 13 years of age Some of the subject tribes, however, refused to obey him and chose another chief belonging to the same family A war of several years' duration was the result, carried on mostly by Temujin's mother At its termination the young ruler was compelled to retire to Karakorum, the capital of Toghrul Ungh, Khan of the Keraites, and place himself under that monarch's protection Ungh Khan gave him his daughter in marriage and appointed him to the command of the army, in which capacity Temujin gave proof of great military talent, conquering the Mekreit, Tanjut, Jellaeir, and other neighboring tribes His growing reputation aroused the jealousy of his master, who ordered him to be assassinated, but Temujin fled to his own country, where he arrived after many hairbreadth escapes at the head of 5000 cavalry Raising an army, he marched against his father-in-law, and Toghrul, vanquished in battle in 1203, sought refuge among the Naymans, but was slain by the guards situated on the frontiers Temujin immediately seized upon Toghrul's dominions In the following year a number of Tatar tribes, alarmed at his increasing power, formed a powerful league against him The command was given to Tai Ungh Khan, chief of the Naymans, but in a battle fought on the banks of the Amur, Temujin routed his enemies, slew their leader, and became at once master of almost all Mongolia Grander views of conquest seemed now opened up before him In the year 1206 he convoked a general assembly on the banks of the Onon, a tributary of the Amur, flowing through his native land This meeting was attended by deputies from the subjugated hordes of Tartary, and the astute monarch contrived to obtain a religious confirmation of his designs Up to this period he had borne the name of Temujin, but a renowned magician or priest, surnamed Bout-Tangri ("Son of Heaven"), venerated by all the Mongols, now came forward and pronounced him Genghis Khan —i e, Greatest of Khans, or Khan of Khans, declaring that he should rule over the whole earth The deputies were duly impressed About this time the Uigurs, an agricultural and civilized people, inhabiting the country at the sources of the Hoang-ho and Yang-tse-kiang, voluntarily submitted to his sway From this people, who professed Buddhism, the Mongols appear to have acquired a knowledge of writing They adopted the Uigur alphabet, but preserved their own language, and Genghis selected one of the tribe to instruct his children

The most important incident in the career of Genghis was the conquest of the northern part of China, or Khatai The immediate cause of the war between him and the Emperor of China, Tchong-Hei, was the refusal of the former to recognize the latter as his suzerain, or liege lord Most of the Tatar tribes which Genghis had subdued were really vassals of the Chinese Empire, and Tchong-Hei, though he had not interfered to prevent the conquests of the Mongols, now called upon Genghis to acknowledge his superiority by paying tribute Genghis immediately prepared for war, scaled the Great Wall in 1211, divided his army into three divisions, and after a series of bloody and protracted campaigns succeeded in taking Peking in 1215 Meanwhile Genghis had quelled an insurrection, headed by the Naymans, and conquered the Gur-Khan of Kara-Khatai These tribes were nearly exterminated in a great fight which took place near the sources of the Yenisei Pressing westward, the Mongols at length reached the Sihun, the northeastern boundary of the Empire of Khwarezm, or Khorasmia, whose ruler, Ala-ed-Din Mohammed, was one of the most powerful sovereigns in Asia The dynasty to which he belonged had risen into power through the weakness of the Seljuk sultans, and its sway now extended from the borders of Syria to the river Indus and from the river Sihun to the Persian Gulf The murder of some Mongol merchants at Otrar, a town on the Sihun, afforded Genghis a pretext for invasion In 1219 an army of 700,000 men, according to the Eastern chroniclers, commanded by Jujy, the son of Genghis Khan, entered Khwarezm Samarkand, Bokhara, and all the other important cities of the country were captured In 1221 Genghis Khan assumed personal command The Mongols in three separate divisions now scoured and ravaged Khwarezm in all directions In the course of five or six years they overran Persia, subdued the inhabitants of the Caucasus, crossed into Russia, and plundered the land between the Volga and the Dnieper They swept over the whole of southern Asia, as far as the Sutlej in northern India, but the exhaustion of the Mongol hordes compelled Genghis to return to Karakorum, the capital of his Empire, in 1224 During his absence his generals had been prosecuting the Chinese war with the greatest success Genghis had still the old thirst of conquest, and, having recruited his forces, he led them across the great Desert of Gobi to the Kingdom of Tanjout, in the northwest of China, the capital of which, Nin-hai, he besieged Disheartened by the loss of the greater part of his army, the King of Tanjout promised to capitulate at the end of a month, but in the interval Genghis died, Aug 24, 1227, on the hill Lioupan, worn out with years and toils He is said to have had 500 wives and concubines and to have left a great number of children, among three of whom he divided his enormous possessions The third son, Ogotai, was appointed Grand Khan and received for his share the region now called Mongolia, with Khatai, or northern China, as far north as the mouth of the Amur The second son, Tcheghatai, received Turkestan north of the Amur. Jujy, for his share, obtained Kiptchak (q v) and all the country west and north of Turkestan, an immense tract extending from the Caspian Sea almost to the Arctic Ocean Sanguinary and barbarous though he was, Genghis showed many statesmanlike qualities and many virtues He was a strict monotheist, but tolerated all religions, exempted from taxes and military service physicians and priests, made obligatory the practice of hospitality, established severe laws against adultery, theft, and homicide, organized a system of communication throughout his dominions, mainly no doubt for military purposes, and so thoroughly organized what may be called the police or civil authority that it

was said that one might travel without fear of danger from one end of his Empire to the other He would appear to have respected men of learning and to have retained several of such about his person The only memorial of Genghis now known to exist is a granite tablet, with a Mongol inscription deciphered by Schmidt, of St Petersburg, discovered among the ruins of Nertchinsk This tablet had been erected by Genghis in commemoration of his conquest of the Kingdom of Kara Khatai Consult Howorth, *History of the Mongols* (London, 1876–88), Erdmann, *Temudschin der Unerschütterliche* (Leipzig, 1862), Douglas, *Life of Genghis Khan* (London, 1877), Hoyle, *History of the Mongols* (ib, 1876–88), Curtin, *The Mongols A History* (Boston, 1908), Johnston, *Famous Cavalry Leaders* (ib, 1908)

GENGLER, gĕng'lĕr, HEINRICH GOTTFRIED (1817–1901) A German jurist, born at Bamberg, and educated at Wurzburg and Heidelberg For more than 50 years he occupied the chair of law at the University of Erlangen His works include *Das deutsche Privatrecht in seinen Grundzugen fur Studierende erortert* (1856, 4th ed, 1892), *Germanische Rechtsdenkmaler,* with a glossary (1875), *Des Schwabenspiegels Landrechtsbuch* (2d ed, 1875) *Ueber die deutschen Stadteprivilegien des 16, 17, und 18 Jahrhunderts* (1901)

GÉNIE DU CHRISTIANISME, zhā'nē' du krēs'tyā'nē's'm (Fr, Genius of Christianity) A celebrated work by Chateaubriand (1802), a defense of Christianity on purely æsthetic and emotional grounds, avoiding all frank discussion of dogma The work gathers together illustrations of the sublime in Christian dogma, poetry, art, and literature, and, besides its religious importance, had a distinct influence on the literary tendency of the nineteenth century

GENII, jē'nī-ī (Lat, guardian spirits). Spirits supposed to protect human beings, or tutelary divinities who presided over places and things The classical nations believed that there were orders of spirits whose function it was to take in charge the infant at birth, to watch over the person day and night during the whole life, to point out to him the right and fortunate thing to do, to warn him of danger and wrongdoing, and thus to guide him safely throughout his life The genii had access to their wards at all times and could change themselves into any desired form The demon (Gk δαίμων) of Socrates is often mentioned as an example of a guardian spirit In his case, however, the philosopher seemed to have believed not so much in an everpresent genius prompting him as in a friendly hand holding him back from danger and wrongdoing. But, according to the classical belief, not only persons were thus cared for, but also there were special spirits in whose keeping the protection of the land itself was believed to be placed. Rome, e.g, had its tutelary genii, and the Lares and Penates were looked upon as household gods embodying the spirit of the hearth and home As such, the various genii received honors and divine worship in ancient Italy and Greece

It is an easy step from this belief in guardian spirits to that in evil, misleading, tempting spirits, who are sent either to test the virtues of the good or to guide the evil mortal in ways of wrongdoing (See DEMONOLOGY) The Greeks had kakodaimones as well as agathodaimones The Romans came to believe in evil genii as well as good It will be readily understood that the early Christians seized upon these ideas, and out of them grew the belief in guardian angels, ministering spirits, and evil genii or spirits

In classical art the genii are sometimes represented in the form of a youth with wings, sometimes as closely wrapped in a mantle and holding within the hand some emblem of their office, and the *genius loci,* or guardian spirit, of a place is often pictured as a serpent partaking of some offering on an altar Under Christian influence the good genius is frequently represented as an angel, the bad genius under some evil guise

The idea of such spirits is a belief widely spread and by no means confined to the classical nations or ancient peoples or uncivilized races The same sort of conception prevailed in ancient and modern India, and the Zoroastrian doctrine of the *fravashis* in the Avesta as heavenly spirits presiding over man and over the house, village, tribe, and country, shows how old this notion was in Persia The Eskimo recognize the same idea in the spirit of the person after whom one is named acting as his guardian genius Among the Mohammedans there is a kindred belief in the existence of jinns, spirits of good and spirits of evil According to their belief, the jinns were the offspring of fire, being superior to man by their magical power, but far inferior to angels They were supposed to be ruled by a race of kings called *Suleyman,* one of whom is believed to have built the pyramids of Egypt They dwelt in the mountain Kōf and assumed at will both human and animal forms

The rôle played by the jinns in the *Arabian Nights,* or by the afrits, or evil genii, in Arabic stories, is familiar to every reader of Oriental literature or of Eastern folklore With the Arabic *jinn,* the Latin *genius* became entangled in the popular mind through the influence of the *Arabian Nights,* although there was no etymological connection between the two The Greek word δαίμων, which was originally used in the general sense of spirit, as explained above, has become degraded to mean *demon* in Christian theology The question of the belief in genii lies near the inquiry into the origin of religion itself, but it is not difficult to trace backward all such beings to the primitive, childish faith which endows everything with human traits and capabilities The shadow, the dreamself, the physiological hallucination, all helped to give substantiality to the creatures of the imagination Consult B Bekker, *Le monde enchanté* (Amsterdam, 1691), M D Conway, *Demonology and Devil-Lore* (3d ed., 2 vols., New York, 1889), R C Thompson, *Devils and Evil Spirits of Babylonia* (2 vols, London, 1903–04) See ANGEL, MAN, SCIENCE OF, APPARITION, DEMONOLOGY, JINN, RELIGION, COMPARATIVE

GEN'IPAP (from *genipapo,* the native name). A much esteemed fruit of the West Indies and warm parts of South America The tree which yields it is *Genipa americana* of the family Rubiaceæ The fruit is a two-celled berry, containing many seeds, about as large as an orange, of a whitish-green color, with a dark-purple juice of an agreeable, vinous taste The species resembles the popular hothouse shrubs of the genus *Gardenia,* of which genus the Cape jasmine (*Gardenia jasminoides*) is perhaps the best-known species.

GENIPI, jĕn'ĭ-pē See ACHILLEA

GENIS'TA A genus of low shrubs of the family Leguminosæ The species, of which there are about 80, natives of the Old World, have small deciduous or almost evergreen leaves, terminal racemes, or clusters of handsome yellow flowers, borne in great abundance in spring or summer, and little pods Few of the species are perfectly hardy in cold climates *Genista tinctoria, Genista angelica,* and *Genista germanica* withstand the winters when given covering *Genista tinctoria,* the dyer's greenweed, has become established in New England and New York The plants succeed best on sandy or rocky, well-drained soils in sunny places The so-called genista that the florists usually bring into blossom about Easter time is a species of *Cytisus*

GEN'ITIVE (Ger, Dan, Swed *genitiv,* Fr *génitif,* Lat *genitivus,* of or belonging to birth, from *gignere,* to produce) The name of one of the cases in grammar (See DECLENSION) In such an expression as (Lat) *regis filius,* (Eng) the *king's son,* the form *regis* or *king's* is called the genitive case, and according to the usual explanation, this name was given it because it indicates the source or origin of the thing joined with it In reality, however, the terms of grammar were originally applied, not to the parts of speech, but to the elements of thought, they were logical terms before they were grammatical The Greek writers on dialectics, in analyzing the different parts of an expressed thought, had distinguished the principal notion, the subject or nominative as it is called, from secondary or dependent notions, the dependency of the latter they expressed by the word πτῶσις (Lat. *casus*), a fall or leaning of one thing upon another, and in such a proposition as "The king's son is dead," they indicated the exact nature of the dependence by calling it the γενικὴ πτῶσις,—i e the case showing the genus, kind, or class, the generic case, for while the name "son" is applicable to every man having parents, "king's son" is limited to the class of sons having kings for their fathers The names thus applied to ideas were transferred to the words expressing them by the Greek grammarians of Alexandria and were afterward translated into their Latin equivalents by the Greek grammarians who taught their language to the youth of Rome But by this time the terms had become strictly technical, and their original signification little thought of, and this may account for the Greek γενική, the Latin equivalent for which is *generalis,* being rendered by *genitivus,* 'generating or producing,' which would have been expressed in Greek by γεννετική

In English the genitive is the only case or relation among nouns expressed by a difference of termination, and even it is often expressed by the preposition *of,* as, the *river's* brink, or the brink *of the river.* From the frequency with which the form in *'s* indicates that one thing belongs to another, it is often called the *possessive* case But this name is little applicable in such expressions as a *day's* journey, still less in many cases where the genitive is used in the ancient languages, e g, *fons lactis,* a fountain of milk The *generic case,* however, meaning that which limits the other noun to a class or kind, will be found to express the real relation in every conceivable combination Besides the *possessive,* the typical usages of the genitive in English are the *partitive* genitive, as "a glass of milk," and the genitive denoting that the governing substantive is what it is in virtue of what depends upon it, as 'the author of the book"

The termination 's was often erroneously supposed to be a contraction for *his,* as if "the king's son" = "the king his son", but it is a genuine relic of the inflections (q v) common at an early stage to all the Indo-Germanic languages *S* was one of the prevalent endings of the genitive singular in the Anglo-Saxon With the ordinary plural termination in *s,* and sometimes in the singular when the noun ends in *s,* the additional *s* of the genitive is omitted, for the sake of the sound, as, kings' sons, Francis' store Consult Van Ginneken, *Principes de linguistique psychologique* (Paris, 1907), Paul, *Prinzipien der Sprachgeschichte* (Halle, 1909), Mauthner, *Zur Grammatik und Logik* (Stuttgart, 1913)

GENIUS, jēn'yŭs (Lat, tutelary godling, from *gignere,* Gk γίγνεσθαι, *gignesthai,* Skt *jan,* to be born) The name given by the ancients to the lesser divinities, good and bad, to whose charge are committed the destinies of the individual human being This usage is still retained, metaphorically, in such phrases as "his good (or evil) genius prompted him" Hence arises, further, the employment of the term for a special aptitude or characteristic, as when we speak of the bent of a man's genius or of the genius of nineteenth-century thought The current meaning of the word, however, which naturally suggests itself in the absence of a limiting context, is that of "an ability that is exceptionally high and at the same time inborn" (Galton) That man is possessed of genius—or *is* a genius—whose natural abilities are of an unusually high order and display themselves in creation or construction, while that man is talented whose natural abilities, though far above the average, depend for their realization upon education and training, and whose superiority is displayed rather in acquisition or in artistic execution than in invention. The man of talent, says Galton, is one in four thousand, the man of genius is one in a million, or even in many millions

Many attempts have been made to define genius Carlyle remarks that it means, first of all, "the transcendent capacity of taking trouble", and when we think of the leaders in science or of great military geniuses, we shall admit the measure of truth in his statement Lowell, on the contrary, declares that "talent is that which is in a man's power; genius is that in whose power a man is"—an account that seems to contradict Carlyle's definition outright, but one whose justice we shall concede when we think, e g, of a poet like Shelley This contrariety of description shows how foolish is the attempt to put a technical interpretation upon the word "genius" or to characterize a "typical" genius There is a popular belief that the man of genius is a puny and unhealthy being, all brain and no muscle, and the work of Lombroso has given new vogue to the old idea that genius is closely related to insanity

Now, there can be no doubt that men of extraordinary gifts have often had poor constitutions; we have only to think of the philosopher Kant as an example But the rule is to the reverse effect a "collection of living magnets in various branches of intellectual achievement" is good to see, writes Galton, for the reason that

they are "such massive, vigorous, capable-looking individuals" For the second belief there seems, unfortunately, to be better evidence We are not called upon to suspect insanity wherever we find an unusually high intelligence this position is negatived by the remark just quoted But high intelligence implies a finely wrought and peculiarly excitable brain, and these characteristics of the nervous system, balanced in the case of the genius by preservative conditions, may appear in his near relatives, without the required checks and preservatives, as some form of eccentricity, if not of mental derangement Consult Galton, *Hereditary Genius* (London, 1892) Lombroso, *The Man of Genius* (New York, 1891), Nordau, *Degeneration* (ib, 1895), Ellis, *A Study of British Genius* (London, 1904), Reibmayr, *Die Entwicklungsgeschichte des Talents und Genius* (2 vols, Munich, 1908), Larned, *A Study of Greatness in Men* (Boston, 1911), Nisbet, *The Insanity of Genius* (London, 1913)

GENLIS, zhân'lês', STÉPHANIE FÉLICITÉ DUCREST DE SAINT-AUBIN, COUNTESS DE (1746–1830). A French novelist, dramatist, and memoir writer, born at the Château of Champcéri, near Autun. She afterward became preceptress (1781) of the sons of the Duke of Chartres, known later as Philippe Egalite Among these was the future King Louis Philippe, for whom she wrote several educational books During the Revolution she lived in Switzerland, in Berlin, and in Hamburg Napoleon recalled and pensioned her She continued to write voluminously during the Revolution and seems to have enjoyed the literary quarrels roused by her cleverly sarcastic *Diners du baron d'Holbach*, witty persiflage of the intolerant fanaticism of eighteenth-century philosophy Her *Mémoires inédits sur le XVIIIème siècle et la révolution française* (10 vols, 1825), and a novel, *Mlle de Clermont* (1802), are other noteworthy works among her 90 volumes, many of which were translated into English She died in Paris. Consult Sainte-Beuve, *Causeries*, vol iii (Paris, 1857), L Chabaud, *Les précurseurs du féminisme* (ib, 1901), C M Bearne, *Heroines of French Society* (New York, 1907), J Harmaud, *A Keeper of Royal Secrets* (London, 1913).

GENNA'DIUS (Lat, from Gk Γεννάδιος). A learned Greek, Patriarch of Constantinople (c 1453–59). His lay name was Georgius Scholarius But little is known of his life, and it has even been thought that there were two writers of the same name living at the same period The first appears in history in 1439, when he accompanied the Emperor John Palæologus to Florence, whither the Council of Ferrara had been adjourned, and where an effort was made to unite the Eastern and Western churches (See FERRARA-FLORENCE, COUNCIL OF, EUGENIUS IV) Scholarius, at this time a layman, played a politic and cautious part, admitting the necessity of union and trying to draw up a form which from vagueness and ambiguity might be accepted by both parties After his return to Constantinople he became a monk and opposed the union which he had formerly favored He next appears in 1453, after the capture of Constantinople by the Turks The conqueror Mohammed, finding that the patriarchal chair had been vacant for some time, chose the monk Gennadius for the office. At the request of Mohammed he drew up a symbol or confession of faith, which is valuable as an expression of the belief of the Greek church After four or five years he resigned his episcopal dignity and retired to a monastery Gennadius was a prolific writer, many of his extant works have never been edited He was an able champion of the Aristotelians in the contest between Platonism and Aristotelianism which marked the transition from mediæval to modern thought For his confession, consult Schaff, *Creeds of Christendom* (4th ed, 3 vols, New York, 1905) Some of his works are in Migne, vol clx (Paris, 1854–66)

GENNESARET, jĕn-nĕs'sa-rĕt, LAKE OF. See GALILEE, SEA OF

GENNESARET, LAND OF A term derived from the faulty rendering in the Authorized Version of the two passages in the New Testament (Matt xiv 34, Mark vi 53) where the name "Gennesaret" is used as referring to a locality. Properly rendered, both passages should read "And having crossed over, they came to land at Gennesaret" The locality so named was a small plain on the western shore of the Sea of Galilee, which derives from it the name "Lake of Gennesaret" (Luke v 1), first used in 1 Macc xi 67 in the form "water of Gennesareth," and appearing several times under differing forms in later writers The plain extended north and south some 3 miles, between the high promontories of Magdala (El-Mejdel) on the south and the hills of Capernaum (Tell Hûm) on the north, and for about 1¼ miles inland to the foot of the western upland In form it was crescent-shaped, lying, with the Sea of Galilee, some 650 feet below the level of the Mediterranean. It was exceedingly fertile, being watered by plentiful streams from the western hills and by copious springs within its own area Josephus' glowing description of its fruitfulness (*War*, iii, x, 8) gives what, after all, is quite likely to have been its condition in the gospel times It was also thickly populated, as is implied in the passage in Mark (vi 53–56), and confirmed by the ruins of towns and villages found scattered over it today

As to the origin of the name, there is much uncertainty. On philological grounds it is not probable, though it has been strongly urged, that it is derived from Chinnereth, the Old Testament name of the lake It is more likely that it comes from some combination of *gan*, 'garden,' or *gey*, 'valley,' with some following element no longer discoverable in the word It is called to-day El-Ghuweir, 'the little hollow' For bibliography, see GALILEE, SEA OF

GENOA, jĕn'ō-a (It. *Genova*, Genoese *Zêna*, Fr *Gênes*) A fortified seaport of Liguria, Italy, capital of the Province of Genoa, formerly the capital of the Republic of Genoa, situated on the Gulf of Genoa and the Bisagno River, in lat 44° 24′ N and long 8° 54′ E (Map Italy, B 2). It is one of the principal ports and important commercial centres of Italy The tonnage of vessels entering and leaving in 1910 was slightly less than that of Naples, but double that of any other port of Italy The mean temperature is 61° F, 9° above that of Turin in the interior, 100 miles northwest At Genoa the January temperature averages 46° F and seldom falls below 23° F, but the changes are sudden, and the winter winds from the surrounding Ligurian Apennines are raw The average temperature at Genoa in July is 76° F.

Seen from the sea, the city justifies its title of "la superba" (the proud) In a 9-mile cir-

cuit it rises like an amphitheatre of churches, palaces, and houses Picturesqueness is added to the panorama by terraced gardens and by bridges, the most remarkable of which is the Ponte Carignano, that leads over seven-story buildings to the church of Carignano and was built in 1718 by the Sauli family It is 361 feet long, 17 feet wide, and 112 feet high The old town is a network of steep, narrow streets lined with high buildings, but the modern encircling and radiating boulevards are broad and magnificent Among these avenues are the imposing Via di Circonvallazione a Mare, on the site of the exterior fortifications, and the Via di Circonvallazione a Monte, stretching superbly along the heights back of the city One of the most characteristic streets in the business section is the Via Garibaldi, with stately palaces The Piazza Ferrari, with its large equestrian statue of Garibaldi, is the converging point of the extensive system of electric street railways, some of which reach the adjacent country through tunnels, giving ample suburban residence facilities. There are also three lines of cable cars

The harbor, with an area of over 600 acres, consists of the Porto, or old harbor, with 19 feet of water, the Porto Nuovo, with 32 feet of water, and the Avamporto for war vessels, with 45 feet of water. The Porto is partially inclosed by the Molo Vecchio, said to have been built in the twelfth century, and by the eighteenth-century Molo Nuovo The additions to the Porto were made (1877–95) at an expense of over $12,000,000, of which the Duke of Galliera contributed $4,000,000. These increases of the area and capacity of the harbor were in part due to increased demands upon the opening of the St Gothard Tunnel, which increased the area served by the port Much of the sea traffic of Switzerland and southern Germany now utilizes this port The harbor now has, besides an elaborate system of quays, a steel floating dock, 282 feet long, a graving dock, and two stone dry docks, 588 and 722 feet long respectively To the west, on rocky Cape Faro, stands the lighthouse (La Lanterna), 384 feet high, with a magnificent view of the sea, harbor, city, Riviera, and mountains Modern batteries and forts render the city a sea and land fortress of great strength The rowing and bathing in and about the harbor add to the attractions of the city.

Genoa is famous for the number of marble palaces in the style of the best period of the Renaissance It is also unique for its many noble staircases It accordingly presents a proud and grand appearance and is the least agreeable and *sympathique* of the great Italian towns The most splendid palaces it owes to the designs of Galeazzo Alessi (died 1572) and his successors, Bianco (1604–56), Tagliafico (1729–1812), and Cantoni (1736–1818), who interpreted Alessi in the spirit of Michelangelo The oldest of the 82 churches is the cathedral of San Lorenzo, founded in 987, rebuilt in the Romanesque style about 1100, restored in Gothic in 1307, and given a Renaissance dome in 1567 The choir was modernized in 1617, and in 1896 the interior was properly restored. In it are statues, paintings, vestments, relics, of which perhaps the most interesting is the Sacro Catino, in which tradition says that Joseph of Arimathea caught drops of the blood of his crucified Saviour There are excellent altarpieces by Baroccio and Battista The most magnificent church in Genoa is the Santissima Annunziata, the most beautiful is the sixteenth-century Santa Maria di Carignano The Annunziata dates from the sixteenth century and is a basilica with a dome, the vaulting being borne by fluted and inlaid shafts of marble Services are held in English at the Episcopal Church, at the Presbyterian Church, and at the Sailors' Missions

Genoa, so rich in architecture, is poor in masterpieces of painting and sculpture The principal picture galleries are in the Palazzi Rosso and Bianco, presented to the city by the Duchess of Galliera, in the seventeenth-century Palazzo Balbi-Senarega (private), and in the Palazzo Durazzo-Pallavicini, which also contains a library with examples of early printing The Rosso collection embraces meritorious paintings by Paris Bordone, Bassano, and Van Dyck The Bianco contains letters by Columbus, majolica, coins, miniatures, tapestries, Oriental vases, and noteworthy paintings by Rubens and David. The Balbi-Senarega Palace is perhaps the most pleasing one in the city, owing to its Doric court with colonnades set off by an orangery Among the good paintings here are works by Rubens, Titian, and portraits by Van Dyck The city owns the Villetta di Negro, with its artistic pleasure gardens and fountains It contains the municipal museum and zoological gardens The Palazzo Doria was presented in 1522 to Andrea Doria (q.v), "father of his country," and, as the Latin inscription on the building says, admiral of the Papal, Imperial, French, and Genoese fleets. The building was remodeled in 1529 by Montorsoli, after plans suggested by Doria, and was at that time decorated with frescoes by Perino del Vaga, a pupil of Raphael The interior of the little thirteenth-century Gothic church of San Matteo was also remodeled by Montorsoli The façade of the church bears inscriptions in honor of the Doria family, the sword of Andrea Doria hangs over the high altar, and his tomb is in the chapel The thirteenth-century Palazzo Ducale, remodeled in the sixteenth century, and, after a fire, modernized in 1777, was once the residence of the doges, now it is given over to judges and police commissioners. The seventeenth-century Palazzo Reale, acquired by the royal family in 1815 and restored in 1842, is magnificently furnished In the church of Santo Stefano is a celebrated painting by Giulio Romano, "The Stoning of Stephen"

In the Piazza Acquaverde, before the railway station, there is a marble statue of Columbus, who was born near or in Genoa. This monument, sculptured in 1862 by Canzio, has four allegorical figures—Religion, Science, Strength, and Wisdom At the foot kneels a figure representing America. On the pediment of the Palazzo Farragiana, opposite, are scenes from the life of Columbus in marble relief In the sixteenth-century Palazzo Municipale (City Hall) is a mosaic portrait of him, and in the pedestal of his bust are preserved the originals of some of his letters There are also memorials of him in the Palazzo Bianco He is said to have been baptized in the architecturally interesting church of Santo Stefano The Municipale possesses also Paganini's famous violin (Guarneri) Among the many monuments which enrich the spacious piazzas and corsos of Genoa are those of Victor Emmanuel and Mazzini, who was born here, and an immense bronze monument to the Duke of

Galliera The modern Campo Santo (cemetery) is beautifully laid out on the north bank of the Bisagno It contains many splendid monuments and is famous for its imposing appearance, crowning rotunda, and galleries with their striking variety of sculptured monuments In the environs are several lordly and celebrated villas, and gorgeous views of sea and shore abound on every hand, as in the city itself

The finest court and stairway in Genoa are in the Palazzo dell' Universita, which was begun as a Jesuit college in 1623 and transformed into a university by Napoleon in 1812 The university had in 1914 about 175 instructors (including docents) and over 1000 students Among the principal libraries are that of the university, the city library (in the Academy of Fine Arts), that in the Palazzo Rosso, the Missioni Urbane, and the Franconia Genoa has two royal gymnasia, two royal lyceums, a theological seminary, a royal school of shipbuilding, a commercial school of university rank, five technical schools, three royal normal schools, two technical evening schools, a school of technical design, and the industrial school Duchessa Galliera

Among the splendidly equipped institutions of charity, to which the city grants liberal appropriations, are the Pammatone Hospital, with beds for 700, founded in 1420 by Bartolommeo Bosco, the poorhouse, founded in 1655 and enlarged in 1835, with accommodation for 1400, the hospital for the incurable, the Sant' Andrea Hospital, the asylum for the deaf and dumb, the orphan asylum, with accommodation for 600 girls, the insane asylum, the asylum for the blind, the Protestant Hospital; and the children's hospital

Of the seven principal theatres the most important—one of the largest in Italy—is the Teatro Carlo Felice, built in 1828, with 3000 seats. There are excellent electric-lighting, gas, telephone, water, and sewerage systems, and the death rate has declined appreciably during the past generation The city government has a high reputation for efficiency Genoa is the seat of an archbishop

There is regular communication by steamship with the principal Mediterranean ports, with Germany and the British Isles, with New York, and with Asia and Australia The headquarters of the Navigazione Generale Italiana and of other steamship companies are here

As a commercial centre, Genoa has made very rapid advances and is one of the most important of the Mediterranean ports The connections by rail with the St Gothard Tunnel, 200 miles north, render it the principal port on the Mediterranean for Switzerland, Germany, and a part of Austria The east railway station in the city is connected with the main, or west, station by a subway 1½ miles long, which has a branch diverging to the harbor station The harbor station is connected with the various docks by rail. The warehousing system has been greatly strengthened.

In 1912 the total commerce of Genoa, exclusive of the transit trade by land and sea, amounted to $306,140,000 The imports were valued at $207,680,100, the exports were valued at $98,360,000 The transit trade amounted to approximately $60,000,000, chiefly merchandise for Switzerland and southern Germany In 1891 the value of the imports was about $78,000,000, of the exports about $18,000,000, in 1877 the imports were valued at $58,000,000, exports at about $9,500,000 The number of vessels entering in 1910 was 5970, with a tonnage of 7,475,583, clearing 5979, tonnage 7,485,717 The number of vessels entering and clearing in 1891 was 12,256, with registered tonnage of only 6,421,637 In the seventies the number of vessels entering and clearing averaged only 5000, with tonnage of about 2,000,000 The principal imports in 1912 were coal, chiefly from Great Britain, about $20,000,000, wheat, $25,310,000, cotton, valued at about $44,000,000, metals, $24,000,000 The principal exports were cottons, valued at about $20,000,000, also fruits, wine, cheese, macaroni, soap, hats, and marble American cottonseed oil is mixed here in large quantities with olive oil and exported The industrial interests are also important

The manufactures are velvet and silk fabrics, woolen goods, cotton goods, ribbons, damask, embroidery, artificial flowers, hats paper, leather and leather goods, furniture, objects in gold, silver, ivory, marble, alabaster, and coral, essences, soap, preserved fruits, chocolate, macaroni, and vermicelli San Pier d'Arena (q v), the most important suburb of Genoa, is a manufacturing centre The large imports of grain have led to the establishment in the neighborhood of Genoa of numerous flour mills Pop. (commune), 1901, 234,710, 1911, 272,221

History In ancient and mediæval times Genoa was probably an important seaport At the time of Augustus Genoa was, according to Strabo, "a flourishing town and the chief emporium of the Ligurians," but there is surprisingly little material for its early history A Greek cemetery of the fifth and fourth centuries B C has been discovered We learn that Genoa was destroyed by the Carthaginians and restored by the Romans, that it had municipal rights, that its wine was good, and that is about all the information. During the Dark Ages Genoa, with different barbarian overlords, maintained in greater part its municipal organization In 936 it was plundered by the Saracens, against whom it had been a bulwark of defense for the whole of Liguria In the following century Genoa and Pisa formed an alliance to expel the Saracens from the strongholds of Corsica and Sardinia This being effected, the Genoese obtained, by papal arbitration, the grant of Corsica, while Sardinia was assigned to the Pisans. For the next two centuries the two cities were almost continually at war, until in 1284 in the naval battle of Meloria the Genoese broke the power of Pisa Meanwhile the Genoese had vigorously cooperated in the Crusades and, as material reward, had obtained important commercial privileges in the Holy Land The city had also established settlements at Constantinople, in the Crimea, in Syria, Cyprus, Tunis, and Majorca, and rose to such a height of maritime power throughout the Mediterranean that the natural sequence was a long-continued struggle with Venice, which terminated after the Venetian victory at Chioggia in 1380, decidedly disadvantageously to Genoa

During both the Pisan and the Venetian wars internal dissensions had weakened the city and occasioned changes in the form of government The election of the first Genoese Doge was in 1339 This supreme magisterial office, which was held for life, and from which nobles were excluded, continued for two centuries The great

Genoese Bank of St George was the most important factor in the city

The ambitious contentions of four leading families—viz, the Adorni, the Fregosi, the Guarci, and the Montaldi—succeeding those of the patrician houses of Doria, Spinola, Grimaldi, and Fieschi, engendered such disastrous civil strife under the early doges that in 1396 the citizens invoked the protection of the French King Charles VI and finally submitted to the rule of the Visconti (q v), the lords of Milan, in 1464 After the invasion of Louis XII in 1499, Genoa was subject to the French till 1528, when the genius and resolution of a great citizen, Andrea Doria (q v), freed his country from foreign invaders and restored to Genoa Republican institutions But the power of Genoa was on the wane The Turks seized her Oriental possessions, the French bombarded the city in 1684, and the Austrian troops occupied it for a brief time in 1746 In 1736 the Corsicans, who had for seven years been in rebellion, chose a Westphalian nobleman named Neuhof (q v) as their King He was soon expelled by the Genoese with the aid of the French, who in 1768 obtained the island During the French Revolution, when the French swept over Italy, Genoa sought to remain neutral, but, being threatened by the English under Nelson, finally joined France Then a Democratic uprising favored by Napoleon put an end to the sway of the nobility In 1797 a Democratic constitution was adopted, and the Ligurian Republic established In 1800 the French general Masséna was besieged in Genoa by the Austrians and English and forced to capitulate In 1805 Napoleon annexed the Ligurian Republic to the French Empire After the fall of Napoleon Genoa was, against her will, awarded by the Congress of Vienna to the Kingdom of Sardinia (q v) Consult Mallison, *Studies from Genoese History* (London, 1875), Canale, *Nuova Istoria della Republica di Genova* (4 vols, Florence, 1858–64), Bent, *Genoa How the Republic Rose and Fell* (London, 1881), Duffy, *The Tuscan Republics, with Genoa* (New York, 1893), Carden, *The City of Genoa* (ib, 1908), Staley, *Heroines of Genoa and the Rivieras* (ib, 1911)

GENOA, GULF OF The portion of the Mediterranean, near the Italian city of Genoa, which is partially inclosed by the Province of Liguria (Map Italy, B 3)

GENOUDE, zhā'nōōd', the name by which ANTOINE EUGÈNE GENOUD is usually known (1792–1849) A French publicist, born at Montélimar (Drôme) At first a student of eighteenth-century philosophy, he became an ardent Catholic and upholder of the Bourbons. He worked zealously for universal suffrage He was one of the founders of *Le Défenseur* (1820), which was replaced by *L'Etoile* (1821), the government organ, and he revived the old *Gazette de France* (1825), in which he opposed the Martignac ministry After the revolution of July (1830) he attacked the new party with much vigor In 1835, the year following the death of his wife, he took orders He was elected a deputy in 1846 His works include *Voyage dans la Vendée et dans le midi de la France* (1820), *La raison du christianisme* (1834–35); a translation (1837–43) in French of the Church Fathers of the first three centuries; and a 16-volume *Histoire de France* (1844–47)

GENOUILLÈRE, zhā'nōō'yâr' (Fr. knee-piece) A term in fortification (q v), denoting that part of the interior slope of the parapet which serves as a cover for the lower part of a gun carriage The term itself is derived from one of the articulated pieces of metal used in suits of armor In the thirteenth century it was a kneepiece of beaten metal (iron) held in place by a leather bandage or strap, but subsequent improvements made it much more pliable and added (in the fourteenth century) large rings which projected rearward on each side of the knee joint

GENOVESI, jā'nō-vā'sē, ANTONIO (1712–69). An Italian writer on philosophy and political economy At an early age he was destined by his father for the Church and began the study of theology in a monastery He took orders and was appointed to the chair of rhetoric in the theological seminary of Salerno He now read with eagerness the works of the chief modern philosophers and was particularly attracted by Locke Dissatisfied with ecclesiastical life, Genovesi resigned his post at Salerno and proceeded to Rome, where he undertook the study of law and qualified as an advocate The details of legal practice, however, proved as distasteful as theology, and for some years he gave himself up entirely to the study of philosophy, attending most of the distinguished lectures at the University of Naples At this place, after having obtained the appointment of professor extraordinary of philosophy, he opened a seminary or private college for students His reputation as a teacher was increased by the publication in 1743 of the first volume of his *Elements of Metaphysics* and in 1745 of his *Logic* Both works are imbued with the spirit and principles of the Empirical school of philosophy On account of the accusation of infidelity and heresy excited by his discussions of metaphysical principles, he had some difficulty in obtaining the professorship of moral philosophy and failed in his effort to be appointed to the chair of theology He published a continuation of his *Elements of Metaphysics*, but with every new volume he experienced fresh opposition from the partisans of scholastic routine In spite of this Genovesi obtained the approbation of Pope Benedict XIV, of several cardinals, and of most of the learned men of Italy Among them was Intieri, a Florentine, who founded at his own expense, in the University at Naples, the first Italian chair of political economy, under three conditions, viz, that the lectures should be in Italian, that Genovesi should be the first professor, and that after his death no ecclesiastic should succeed him In 1765 he published the results of his economic studies in *Lezioni di commercio o sia economica civile* He was one of the first in Italy who dared to write upon philosophy in the common language of the country His *Opere scelte* were published (4 vols, Milan, 1835) Consult Bobba, *Commemorazione di A Genovesi* (Benevento, 1867), and Gentile, *Dal Genovesi al Galluppi* (Rome, 1903)

GENRE (zhäN'r', Fr, sort) **PAINTING.** A term used in art to denote that class of subjects which portray the intimate and everyday life of any people This draws the line sharply between genre and historical painting, which latter depicts important moments of national life The subjects are the familiar life of the family, street scenes and sports, festivals and picnics, tavern scenes—all that goes to make up the occupations of a people These may be

comic, serious, or pathetic, but genre painting, strictly speaking, always includes as a dominant note the human element If actual historical personages are represented, the picture is termed "historical genre"

History Genre painting was practiced by the Greek artists of the late Greek and Roman epochs, as may be seen in the surviving examples unearthed at Pompeii During the fifteenth century real genre subjects were represented, both in Italy and the Netherlands, as religious pictures, at Florence by Ghirlandaio and Gozzoli and others, and in Venice in the sixteenth century by Giorgione and the Bassani. It was first developed as an independent art in Flanders during the sixteenth century, particularly by Pieter Breughel the elder, and after him by Brauwer and Teniers in the seventeenth century, which was indeed the golden age of genre This was especially the case in Holland, where even the greatest masters, like Hals and Rembrandt, were genre in tendencies Around them a group of painters developed who depicted, in pictures of small form, every phase of Dutch life—Ostade, Dou, Jan Steen, Ter Borch, Metzu, Pieter de Hoogh, Vermeer van Delft, to mention a few of many names During the eighteenth century genre painting was practiced by many able painters in France, such as Watteau, Lancret, Chardin, Boucher, Fragonard, and in England by Hogarth In the second quarter of the nineteenth genre painting became popular in all the European countries, in the works of such artists as Meissonier, Roybet, Bargue, Vibert, and others in France, Fortuny and his many followers in Spain and Italy, Wilkie, Newton, the American Leslie, Mulready, and Frith in Great Britain, and Knaus, Defregger, Dietz, and Grutzner in Germany In the United States most of the figure painters of the middle period also painted genre subjects, and a few, like J. G. Brown and Mount, devoted themselves entirely to it The more recent modern naturalistic tendency, which regards nature as a whole, is hostile to specialization, and genre painting is at present little practiced as a special branch. See PAINTING, and the articles on the genre painters mentioned above

GENS (Lat, race) A word sometimes used by the Romans to designate a whole community, the members of which were not necessarily connected by any known ties of blood, though some such connection was probably always taken for granted. In this sense we hear of the *gens Latinorum, Campanorum,* etc But *gens* had a far more definite meaning in the constitutional law of Rome According to Scævola the pontifex, those alone belonged to the same *gens,* or were "gentiles," who satisfied the four following conditions: (1) who bore the same name, (2) who were born of freemen, (3) who had no slave among their ancestors, and (4) who had suffered no *capitis diminutio* (reduction from a superior to an inferior condition). In the identity of name some sort of approach to a common origin seems to be implied The Roman *gens,* in fact, included all those who could trace their descent, through males, from a common ancestor The *gens* thus consisted of many families, supposed to be nearly allied by blood Consult Lange, *Romische Alterthümer,* vol. i (3 vols., Berlin, 1877)

The Roman form of organization is found among all races and in every part of the world and is now known generically, by the common consent of ethnologists, as the clan (q v), although in literature and in history *gens* is the familiar term The clan is a body of kindred wider than a family or household and narrower than a tribe (q v), and recognizing relationship, together with the right to names and to property, in one line of descent only, through the mother but not through the father, or through the father but not through the mother The primitive clan, found in savagery and the lower stages of barbarism, is a totemic group (see TOTEMISM), or "totem kin" Its members hold sacred some species or variety of plant or animal, regarded as female in sex, and claim to be descended from it Such are in many cases the clans of the Australian aborigines and of the North American Indians Clans thus tracing descent through the mother are called matronymic, the clans found in a higher stage of social evolution, as among the Arabs, the Greeks, and Romans, and the Slavs, the Celts, and the Teutons at the dawn of European history, in which descent is reckoned through fathers, are called patronymic The Greek γένος, and its equivalent form the Roman *gens,* were highly developed patronymic clans The discovery that the totemic organization of the North American Indians was in all essentials like that of the Roman *gens,* except in being matronymic, was made by Lewis H Morgan From this discovery to that of the practical universality of the clan as the characteristic social form of tribal communities was but a step, and the wider generalization was offered by Morgan in his *System of Consanguinity and Affinity of the Human Family* (Washington, 1869) The functions of this clan are economic, religious, and juristic It usually holds common property and a burial place It regulates marriages, in the primitive clan the clansman may not marry his own clanswoman This restriction was breaking down in the Roman *gens* at the beginning of the authentic historic period. All clansmen were bound to defend one another and to redress one another's injuries In Morgan's writings the word *gens* is everywhere used for clan, and his use of *gentile* to distinguish tribal from civil society has been usually followed Consult the article "Gens," in Smith, *A Dictionary of Greek and Roman Antiquities,* vol i (3d ed, London, 1890), the article "Gens," in Pauly-Wissowa, *Real-Encyclopadie der classischen Altertumswissenschaft,* vol vii (Stuttgart, 1912), Greenidge, *Roman Public Life* (London, 1901), Botsford, "The Social Composition of the Primitive Roman Populus," in *Political Science Quarterly,* vol xxi (Boston, 1906), id, "Some Problems Connected with the Roman Gens," in *Political Science Quarterly,* vol xxii (1907), id, *The Roman Assemblies* (New York, 1909)

GENSAN, gĕn'sän' See WONSAN

GEN'SERIC, or, more correctly, **GAI'SERIC** (?400–477) King of the Vandals (q v). He was an illegitimate son of Godigisdus, who led the Vandals into Spain After the death of his brother Gonderic, Genseric became sole ruler In the year 429 he invaded Africa, on the invitation of Boniface, Count of Africa, the Viceroy of Valentinian III, Emperor of the West, who had been goaded to rebellion through the machinations of his rival Aetius (See BONIFACIUS) Genseric's army at first amounted to 50,000 warriors. As they swept through Mauritania, the Kabyle mountaineers and the Donatist heretics swelled the horde and more than equaled

their associates in acts of cruelty and bloodthirstiness The friends of Boniface, astonished that the hero who alone had maintained the cause of the Emperor and his mother Placidia during their exile and distress should have invited the Vandals to Africa, attempted, with ultimate success, to bring about an interview between the Count of Africa and an agent of the Empress The army Boniface hurriedly collected to oppose the Vandals was twice defeated by Genseric, and he was compelled to retire to Italy, where he was soon afterward slain by Aetius All Africa west of Carthage fell into the hands of Genseric, who shortly after seized that city itself and made it (439 AD) the capital of his new dominions He also took possession of part of Sicily, Sardinia, and Corsica In 451 he encouraged Attila to undertake his great expedition against Gaul Tradition states that, at the request of Eudoxia, the widow of Valentinian, who was eager for revenge upon her husband's murderer, Maximus, Genseric in 455 marched against Rome, which he took, and abandoned to his soldiers for 14 days On leaving the city he carried with him the Empress and her two daughters, one of whom became the wife of his son Huneric The Empire twice endeavored to avenge the indignities it had suffered, but without success First, the Western Emperor, Majorian, fitted out a fleet against the Vandals in 457, which was destroyed by Genseric in the Bay of Cartagena, secondly, the Eastern Emperor, Leo, sent an expedition under the command of Heraclius and others, in 468, which also was destroyed, off the city of Bona Genseric died in 477, in the possession of all his conquests He seems to have regarded himself as a "scourge of God" In creed Genseric was a fierce Arian and inflicted the severest persecutions upon the orthodox, or Catholic, party. Consult Hodgkin, *Italy and her Invaders*, vols. ii and iii (6 vols, 1892–95), Gibbon, *Decline and Fall of the Roman Empire* (Bury's ed., London, 1906–12), Martroye, *Genseric La conquête vandale en Afrique* (Paris, 1907); *Cambridge Mediæval History*, vol i (New York, 1911)

GENSFLEISCH, gĕns'flīsh. See GUTENBERG, JOHANNES

GENSICHEN, gĕn'sĭk-en, OTTO FRANZ (1847–) A German author, born at Driesen, Prussia, and educated at Berlin. After an association as dramaturgist with the Wallner Theatre in Berlin (1874–78), he devoted himself exclusively to literary work His principal publications include *Gedichte* (2d ed, 1871); *Vom Deutschen Kaiser*, 12 poems (4th ed, 1871), *Felicia*, an epic (16th ed, 1882), plays, including *Robespierre* (1873), *Phryne* (1878), and *Jungbrunnen* (1901), and novels, including *Blutschuld* (1905)

GENSONNÉ, zhan'sŏ'nā', ARMAND (1758–93) A French legislator, born at Bordeaux He was elected a deputy from the Gironde to the Legislative Assembly, was Commissioner to La Vendée, with Gallois, and proposed the Law of Dec 31, 1791, accusing the brothers of the King and several members of the aristocracy The decree of confiscation against the property of the emigrants (Feb 9, 1792) and the declaration of war against the King of Bohemia and Hungary (April 20, 1792) were drawn up by him He was President of the National Convention for two weeks in March, 1793, but was imprisoned (June 2, 1793), was tried for treason (October 3), and was executed with his Girondin associates (on the 31st).

GENTH, gĕnt, FREDERICK AUGUSTUS (1820–93) An American analytical chemist and mineralogist, born at Wachtersbach, Hesse He was educated at Heidelberg and other German universities From 1845 to 1848 he assisted Bunsen He went to Philadelphia in 1848 and set up an analytical laboratory In 1872 he was appointed to the chair of chemistry in the University of Pennsylvania, but resigned in 1888 and reopened his laboratory He established 23 new minerals, wrote extensively on chemistry and mineralogy, and was best known for his publications, which included *Researches on the Ammonia-Cobalt Bases*, with Wolcott Gibbs (1856), a study of "Corundum," in *American Philosophical Society Proceedings* (1873), and a report as chemist and mineralogist to the Geological Survey of Pennsylvania, on the mineralogy of the State He was a founder, and president (1880), of the American Chemical Society

GENTH, gĕnt, LILLIAN MATHILDE (1876–) An American figure painter She was born in Philadelphia and studied there at the School of Design for Women, under Elliott Daingerfield Later she continued her studies under Whistler in Paris, returning to America in 1903 From an early style, in which her color was sombre, she turned to painting in a higher key, her usual subject being the female nude with a landscape background She also did some work in portraiture, attaining a measure of popularity in both fields In 1904 she received the Mary Smith (Pennsylvania Academy) prize for pictures done by women, in 1907 the Shaw memorial prize, and in 1911 the first Hallgarten prize at the National Academy of Design (of which she was elected associate). Pictures by Miss Genth are in the National Gallery, Washington, the Carnegie Institute, Pittsburgh, the Metropolitan Museum, New York, and the Brooklyn Institute Museum.

GENTHITE, gĕn'thīt A hydrated magnesium silicate closely related in composition to serpentine (q v), but with part of the magnesium replaced by nickel It occurs in amorphous crusts of a resinous lustre and apple green to yellowish green in color A variety known as garnierite, which is found extensively near Noumea, New Caledonia, is an important ore of nickel

GENTIAN, jĕn'shan (Lat *gentiana*, Gk. γεντιανή, *gentianē*, said to have been named after an Illyrian king, defeated by the Romans about 160 BC, *Gentius*, Gk. Γέντιος, who first discovered the properties of the plant) A genus of plants of the family Gentianaceæ The species are numerous, natives of temperate and boreal parts of Europe, Asia, North and South America, and New Zealand, many of them growing in high mountain pastures and meadows, which they adorn by their beautiful blue or yellow flowers. The common gentian, or yellow gentian (*Gentiana lutea*), is abundant in the meadows of the Alps and Pyrenees at elevations of 3000 to 6000 feet It has a stem 3 or 4 feet high, ovate-oblong leaves, and numerous whorls of yellow flowers The part employed in medicine is the root, which is cylindrical, ringed and more or less branched, and which appears in commerce in a dried state, in pieces varying from a few inches to more than a foot in length, and from ½ inch to 2 inches in thickness. It is

collected by the peasants of the Alps Although gentian root has been examined by various chemists, its constituents are not very clearly known it contains, however, gentiopicrin, gentianin or gentisic acid, pectin, fixed oil, and sugar As much as 14 per cent of the last is present, and in consequence of it an infusion is capable of undergoing fermentation and of forming the "bitter snaps," or "Enziangeist," which is much employed by the peasants on the Swiss Alps Gentian is a highly valued medicine, a simple tonic, bitter without astringency, and is much used in diseases of the digestive organs and sometimes as an anthelmintic The bitter principle on which its virtue depends exists in other species of this genus, probably in all, and appears to be common to many plants of the same order Roots of inferior quality of the species *Gentiana purpurea*, *Gentiana punctata*, and *Gentiana pannonica* are often mixed with the gentian of commerce Among the most common European species are *Gentiana campestris* and *Gentiana amarella*, plants of a few inches in height, with small flowers, both species being used as tonics in domestic medicine *Gentiana saponaria*, a North American species, is extensively used in its native country as a substitute for common gentian, and *Gentiana kurroo* is employed in the same way in the Himalayas Several species of gentian are common ornaments of gardens, particularly *Gentiana acaulis*, a small species with large blue flowers, a native of the countries of Europe and of Siberia, often planted as an edging for flower borders *Gentiana andrewsii* and *Gentiana puberula*, American species—the former known as closed gentian or bottle gentian from the nonopening of the flowers, and the latter with blue, funnel-shaped flowers—are common in American gardens Of the fringed-gentian species *Gentiana crinita* is particularly celebrated for the beauty of its flowers, which are large, blue, and fringed on the margins It has a branched stem and grows in wet ground The brilliancy of the flowers of the small Alpine species has led to many attempts to cultivate them, which have generally proved unsuccessful, apparently from the difficulty of imitating the climatic and soil conditions of their native heights The horse gentian is *Triosteum perfoliatum* See FEVERWORT, and Colored Plate of MOUNTAIN PLANTS

GENTIANACEÆ, jĕn'shan-ā'sē-ē (Neo-Lat. nom pl, from Lat *gentiana*, gentian), the gentian family A family of dicotyledonous plants, most of which are herbaceous, though a few are small shrubs Many of the herbaceous species are perennial from a rhizome The leaves are, for the most part, opposite and without stipules The inflorescence is some form of cyme, and the flowers are usually regular The calyx is 5, sometimes 4, 6, 8, or 10, parted The corolla, which is hypogynous, has the same number of lobes as the calyx. The stamens are of the same number as the corolla lobes and the ovary, which consists of two carpels and contains numerous small seeds. The family comprises about 60 genera and more than 750 species Species of this family are found in nearly every part of the globe and in all sorts of situations Some are arctic and alpine plants, some are saprophytes, some grow in dry situations, others in marshes, while the species of one genus are aquatic in habit The flowers of many are of great beauty, both as to color and form, and some are cultivated as ornamentals Medicinal properties are attributed to some The principal North American genera are *Sabbatia*, *Centaurium* (centaury), *Gentiana* (gentian), *Frasera* (American columbo), and *Menyanthes* (buck bean) See BUCK BEAN, GENTIAN, CENTAURY

GENTILE DA FABRIANO, jĕn-tē'lā da fa'brē-a'nō (c 1360–c 1428) The chief Umbrian painter of the transition from the Middle Ages to the Renaissance He was born at Fabriano, in the March of Ancona, and studied with Allegretto Nuzi He has also been called the pupil of Fra Angelico, but this is not probable He must have attained a high reputation in his art by 1411, for about this time he was summoned by the Doge to Venice to fresco the great audience hall of the Ducal Palace The subjects were scenes glorifying the part of Venice in the struggle between Pope Alexander III and Emperor Frederick Barbarossa, which he depicted with such success that he was rewarded by a pension and certain privileges accorded to the nobility. He exercised a very important influence on the early Venetian school, particularly on the painters of Murano About 1422 he went to Florence, where he was enrolled in the painters' guild In 1423 he painted his chief surviving masterpiece, "The Adoration of the Magi," now in the Florentine Academy He was active also in other Italian cities, as in Orvieto, where his fresco of the Madonna still survives in the cathedral For Pope Martin V he painted frescoes in St John Lateran, of which fragments still survive in the Vatican Museum and elsewhere His chief surviving panels, besides the "Adoration," are a "Madonna in Glory," with other parts of an altarpiece representing saints, in the Brera, Milan, a "Presentation in the Temple," in the Louvre (formerly belonging to the "Adoration" altarpiece), "The Magdalen, St John the Baptist, St Nicolas of Bari, and St. George" (1425), and Madonnas in the museums of Berlin, Perugia, Pisa, and in the Jarves collection (New Haven, Conn)

Gentile's beautifully studied pictures sparkle with gold and colors like jewels The figures are always animated and the faces smiling Although he clung to primitive methods of painting, in technical knowledge he went beyond most artists of his time His chief pupil was Jacopo Bellini, who worked with him in Venice and Florence Consult Vasari, *Lives of the Most Eminent Painters* (10 vols, New York, 1912)

GENTILES, jĕn'tīlz (Lat *gentilis*, belonging to a clan, or family, from *gens*, tribe, family). A term often used in the Bible, especially in the New Testament, to designate the non-Israelitic peoples It represents the Hebrew *goyim* (pl of *goi*), 'nations' The peculiar significance of the term "Gentile" in Jewish and early Christian usage simply marks the crystallization of a long previous process of doctrinal development

Prior to the conquest of Canaan Israel's life was of a strictly tribal character, and in accordance with the common Semitic ideas the tribes constituting Israel probably felt that they differed from other tribes or peoples only in the fact that they worshiped their God, Yahwe, while the other peoples worshiped their particular deities Hence in the old stories of the patriarchal age there is manifest no special hostility or attitude of superiority towards the surrounding nations

The occupancy of Canaan and the development of a vigorous Hebrew nationality after a long

struggle with the old inhabitants and with outside nations led to a new and more positive national consciousness Israel was now a people (Heb *'am*), Yahwe's people, one of the *goyim* of the earth, ready to assert its peculiar rights and privileges

The historical narratives pointed out how Israel was specially called of Yahwe to be His own peculiar people, and the legislation defined the legal status of foreigners residing in the borders of Israel The early Hebrew law distinguished two classes of such non-Israelites—the *ger*, or *tōshābh*, i e, sojourner, a permanent resident and in sympathy with Israel's life, and the *zar*, or *nokri*, i e, the stranger or foreigner, who was not looked upon so favorably As to the *ger*, the law required of him obedience to the Sabbath law and provided that he was not to be vexed or oppressed He could also present an offering to the priests, which was not allowed to the *nokri* (Lev xxii 25)

In the prophetic teaching (c 750 B C to the Exile) the contrast between Israel and the nations (*goyim*) is most forcibly expressed. Israel's place is unique, and while Yahwe's gracious attitude towards other nations is sometimes asserted, still it is only through Israel that His blessings can be shared by them With this advocacy of Israel's peculiarly exalted position, the prophets also insisted on the open-hearted favorable treatment of the sojourners in Israel required by the older laws.

The legislation in Deuteronomy, influenced by prophetic thought and the later teachings of Ezekiel, and the still later priestly legislation of the Pentateuch, reveal the growth of the tendency to draw the lines more rigidly between the Israelites and the foreigners As a result, we have such teachings as these The *ger* and *nokri* may eat that which dies of itself (Deut xiv 21), which is strictly forbidden to the Israelite, the *nokri* is not entitled to the privilege of the year of release (xv 3), no *nokri* has a right to the throne of Israel (xvii 15), one may lend on interest to the *nokri* (xxiii 20) Furthermore, not only could no *nokri* make an offering, but he also could not enter the sanctuary (Ezek xliv 7, 9) nor eat of the Passover (Ex xii 43). If a *ger* desired to eat of the Passover, he must be circumcised and thus become legally a full Israelite (Ex. xii 48).

Such principles as these, which became the fundamental law of the Jewish communities of postexilic times, show how at last the conviction became deeply rooted and clearly expressed that Israel was, theoretically, a holy entity, a people by itself, altogether unique among the peoples of the earth The other peoples, the *goyim*, were per se profane The Israelite could not meet them as equals. The work of Haggai and Zechariah at the time of the building of the second temple (520–516 B C.) and later that of Ezra and Nehemiah were of great influence in this respect Henceforth the attitude towards the non-Israelite manifested two marked phases On the one hand was the insistence on the idea of separation, of exclusiveness, under all circumstances, so that the Jew, not only in Palestine, but also in the Dispersion, scattered among the Gentiles, was ever a Jew, holding himself aloof from intimate familiar intercourse with the non-Israelite, with a lofty contempt for Gentile ideas and customs A protest against this narrow view, as it was held c 400 B C, was circulated in the form of the parabolic story of Jonah in which God's sympathy for the heathen world is set forth with great pathos The prejudices against the Gentiles were intensified by the bitter struggles of the Maccabæan times and were at last shared by the great majority of Jews, even of the humble classes (cf Acts x 28) Practically violations of these principles were constantly occurring There were certain limits, however, which no Gentile could ever overstep, e g, the prohibition in the temple of Herod marking off the court of the Gentiles from the precincts in which Israelites were allowed, reading as follows "No foreigner may enter within the railing and fence about the sanctuary Whoever is caught so doing renders himself guilty, for death follows"

On the other hand, the early and prophetic teachings, and the legal sentences recommending kindness to the *ger* and emphasizing Yahwe's care for the nations, coupled with the conviction that as Jews they possessed in their Scriptures the only satisfactory, all-sufficient revelation, all combined to make many Jews willing, even anxious, to win over to adhesion to Judaism the foreigners with whom they were in contact Hence arose the practice of proselyting In later Jewish usage the word for proselyte was the old word *ger*, which indicated the most favorable status of the foreigner The Maccabæan princes compelled conquered peoples—the Idumæans, e g —to become Jews, i e, be circumcised But more usually these efforts were carried on privately and with astonishing success, when we remember the almost universal contempt for Jews among the cultivated Greeks and Romans Strictly speaking, there was but one class of proselytes—those who fully accepted Judaism and, if males, became circumcised These were called in later rabbinical literature "proselytes of righteousness" Others, who did not fully embrace Judaism, but were favorably disposed towards it and accepted many of its doctrines and practices, were held in high esteem in the Jewish communities

In the early Church the relation of the Gentiles to Christianity became a most important question—were they to be received mediately, through Judaism, and thus become Christian Jews, or immediately accepted into the Christian brotherhood without being required to be circumcised and obligated to keep the Jewish law? While many early Christians took the former position, Paul advocated the latter and thus broke down the barrier between the religion of Yahwe, Israel's God, and the Gentile world Consult A Bertholet, *Die Stellung der Israeliten und der Juden zu den Fremden* (Freiburg, 1896), also the article by Hirsch and Eisenstein in *The Jewish Encyclopædia*, vol v (New York, 1901–06).

GENTILESCHI, jĕn'tē-lĕs'kē A family of Italian painters—ORAZIO (c 1565–1647), the father, was born at Pisa He was also called Lomi, being a pupil of his half brother and uncle by that name At Rome, in conjunction with Agostino Tassi, a landscape painter, he decorated the interiors of a number of palaces In 1621 he went to Genoa, where he painted "David after the Death of Goliath," in the Palazzo Doria He visited England in 1626, under the patronage of Charles I, and was himself painted by Van Dyck in his series of portraits of illustrious men Among his best works are "Saints Cecilia and Valerian," in the Palazzo Borghese, Rome, "Joseph and Potiphar's Wife,"

at Hampton Court, "Moses Saved from the Waters," in the Madrid Museum, and an "Annunciation," in the Turin Gallery His pictures are striking and vivid in color, but weak in composition and lacking in nobility He died in London—His son FRANCESCO assisted his father in England, but of his work little is known—ARTEMISIA GENTILESCHI (1590–1642), the daughter of Orazio, was born at Rome, and studied under her father and Guido Reni She accompanied her father to England and, in the opinion of Horace Walpole, excelled her parent in portraiture She married Antonio Schiattesi and spent the latter part of her life in Naples Among her most important paintings are "Judith and Holofernes," in both the Pitti and Uffizi galleries, Florence "Mary Magdalen," in the Pitti Gallery, a portrait of herself, at Hampton Court, and "Christ among the Doctors," in the New York Historical Society. Her paintings are careful in execution and remarkable for a skillful use of chiaroscuro, but are poor in composition

GENTILESSE, jĕn'tĭ-lĕs' A poem of Chaucer's which has been preserved as the fifteenth to seventeenth stanzas of "a morale balade of Henry Scogan, Squyer" The latter has been printed in toto in all editions of Chaucer's works from Caxton to Skeat, but the interpolation was pointed out long ago by John Shirley, the fifteenth-century copyist Skeat was the first to print Chaucer's part of the poem separately. The poem was originally addressed to "the Lordes and Gentilmen of the Kinges house" Scogan was an admiring fellow poet and disciple of Chaucer

GENTILI, jĕn-tē'lē, ALBERICO (called in Latin ALBERICUS GENTILIS) (1552–1608) An Italian-English jurist, born at San Ginesio (Ancona). In 1572 he received the degree of LL.D from the University of Perugia Because of his Protestant views he was forced to leave his native town and to flee to Carniola and in 1580 to England, where he was appointed lecturer on Roman law at Oxford and in 1587 regius professor of civil law there So great was his reputation that he was consulted by the government when Mendoza, the Spanish Ambassador, was found to be plotting against Elizabeth (1584) His book *De Legationibus* (1585) discusses this subject. He also wrote *De Jure Belli* (1598), a collection of disputations on the law of war. In 1605 he was made standing counsel for the King of Spain The notes he made while acting in this capacity were published posthumously, under the title *Hispanicæ Advocationis Libri Duo* (1613) The last decade of his life he spent in London in active practice Gentili rendered valuable services to international law, and Grotius is indebted to him for much that is valuable in his own writings Gentili's works were put on the Index Expurgatorius In 1908 a statue of him was unveiled at his birthplace. Consult Holland's edition of *De Jure Belli* (Oxford, 1877) and his *Studies in International Law* (ib, 1898).

GENTILLY, zhàn'tē'yē'. A town of France, situated in the metropolitan Department of Seine, about 2½ miles south of Paris. The great bastioned wall of Paris passes through the town, separating it into two portions, called Great and Little Gentilly The parish church dates from the thirteenth century There are extensive chemical works, potteries, and tanneries Pop, 1901, 7433; 1911, 10,744.

GEN'TLE A maggot See FLESH FLY

GEN'TLEMAN (OF, Fr *gentilhomme*, ML. *gentilis homo*, man of breeding, from Lat *gentilis*, relating to a family, from *gens*, family, and *homo*, man) Originally a person whose kindred was known and acknowledged, which is the sense in which it is still employed when it is not intended to make any reference to the moral and social qualities of the particular individual One who was *sine gente*, on the other hand, was one whom no *gens* acknowledged and who might thus be said to be ignobly born

The term "gentleman" is often confounded with that of "esquire," but the terms are not equivalent, though the latter is in England generally used to-day in correspondence when addressing any man who has no title and is above the class of manual laborers or small tradesmen The same custom holds more or less in America, except in business or official letters, where "Mr" is the more general form of address In America "Mr" is increasingly used also in private correspondence The distinction involved in the choice of these terms is invidious and ridiculous, and "esquire," now a pseudolabel of gentility, might well, in accordance with Matthew Arnold's suggestion, be abolished altogether The term "gentleman," whatever of definite class significance may from time to time have attached to it, has always had as well a certain moral significance, while "esquire" was a word simply descriptive of function, and signifying one who was an attendant upon a knight and in the apprentice stage of knighthood Now it has become a vague and well-nigh meaningless social epithet To assign anything like precise social significance to the word "gentleman" until the fifteenth century would seem difficult At that time a statute of Henry V's required, in legal actions, that the degree and estate of a man should be specified Those who under this requirement called themselves gentlemen were chiefly sons of men of title, hangers-on of great nobles, and fighting men at home or abroad. That the gentleman was at first a fighting man is indicated by the fact that he who would be beyond cavil counted such was wont to procure himself a coat of arms, coat armor being originally a distinguishing badge worn in battle This custom persisted, and Shakespeare, by a grant of a coat of arms, became technically a gentleman That the gentleman was originally a soldier is suggested, too, by the custom, long prevalent on the part of those who claimed to be rightly so styled, of wearing a sword—a custom now generally honored in the breach, though still observed in the case of the sword required in England as a part of court dress In the special sense in which the word "gentleman" was used in the fifteenth century the term soon became obsolete, and it is now, as it has for the most of its history been, of somewhat uncertain or ambiguous meaning On the one hand, there is "nature's gentleman," by which phrase is intended the man of fine, generous, and delicate instincts, whether a son of toil or a man of lineage According to Chaucer, e.g, he who is virtuous and does gentle deeds (consult the *Wife of Bath's Tale*) is a gentleman On the other hand, for centuries past and at the present time, the word often is used in a narrower sense, and one in which it is more nearly synonymous with the French *gentilhomme*, as denoting those whose blood and

race were noble and known Even here, however, it scarcely seems that any connection with a titled family was considered necessary to confer the character, for it is described as corresponding, not to nobility, in the English sense, but to *nobilitas*, in the Roman sense, and as resting on "old riches or powers remaining in one stock" There can be no doubt that in still earlier times patents of gentility were granted by the King of England There is one still in existence by Richard II to John de Kingston, and another by Henry VI to Bernard Angevin, of Bordeaux These patents corresponded to the modern patents of arms which are issued by the heralds' colleges in England and Ireland, and by the Lyon office in Scotland, and were probably given on the payment of fees A patent of arms confers the rank of esquire, and there probably is no other legal mode by which an untitled person can acquire it, unless he be the holder of a dignified office The word, however, is loosely applied to all persons who have not themselves "risen from the ranks," or in a still less limited sense to those who, whatever their origin, display the qualities associated with "gentle" birth Consult Stevenson's essay, "Gentlemen," in *Familiar Studies* (Thistle ed, New York, 1895).

GENTLEMAN DANCING-MASTER, THE. A comedy by Wycherley (1671)

GENTLEMAN GEORGE. A sobriquet of George IV of England.

GENTLEMAN USHER, THE A comedy by Chapman It appeared in 1606

GENTLEMEN-AT-ARMS One of the bodyguard of the British sovereign Its full title is "His Majesty's Bodyguard of the Honorable Corps of Gentlemen-at-Arms" Instituted in 1509 by Henry VIII, under the name of "Speers" or "Men-at-arms," it became known later in the same reign as "Gentlemen Pensioners," and it received its present name in 1834 With the exception of the Yeomen of the Guard, it is the oldest corps in the British service It is composed of a captaincy, the Gold Stick, value £1200 a year, a lieutenancy, the first Silver Stick, £500, a standard-bearership, the second Silver Stick, £310, a clerkship of the check, £120, an adjutancy, a subofficership, and 40 memberships, £70 each The corps does duty only at drawing rooms, levées, and on important state occasions The appointments are crown gifts on the commander in chief's recommendation, and are given to military officers of distinction chosen from the retired list The captaincy is vacated with each ministry

GENTLE SHEPHERD, THE A pastoral drama by Allan Ramsay (1725).

GENTLE SHEPHERD, THE A nickname of George Grenville originating from a satirical aside of Pitt's during debate in the House In considering the advisability of an additional duty on cider, Grenville bewailed in languid utterance the increase of taxes after the late war and demanded *where* they could now be laid. Not receiving an answer, he repeated the inquiry, and Pitt responded softly in the words of the old song "Gentle Shepherd, tell me where"

GENTOO'. A corruption of the Portuguese *gentio* (gentile, heathen), formerly used to designate various Hindu and Dravidian-Kolarian peoples of India—the Telugu, or Telingas, in particular.

GEN'TRY, MEREDITH POINDEXTER (1809–66). An American statesman He was born in Rockingham Co, N C With a natural aptitude for oratory, he became widely known as a public speaker, was a State representative in 1835–39, and in 1839 was sent by his Whig constituents to Congress There he became distinguished for his advocacy of the policy of receiving petitions for the abolition of slavery and his strong speech favoring the restoration of exclusive patronage He was a Representative in Congress from Tennessee from 1839 to 1843 and from 1845 to 1853 In 1862 and again in 1863 he was a member of the Confederate Congress, where he was noted for his moderate policy He was one of the best-informed men of his day on political history, according to Alexander H Stephens, who called Gentry's extempore eulogy of Henry Clay, "apt, powerful, and pathetic"

GENTZ, gĕnts, FRIEDRICH VON (1764–1832) A German publicist and statesman, born at Breslau He studied law at Frankfort and Konigsberg, became in 1786 Secretary of the General Directory in the Prussian service, and in 1793 was made a Prussian war councilor He was very much addicted to liquor and high living A pupil of Kant and a disciple of Rousseau, he at first looked with favor upon the revolutionary movement in France, but was converted by the course of the extremists, and by the influence of Burke, whose essay on the French Revolution Gentz translated in 1794, together with the writings of Mallet du Pan and Mounier (1794–95) He spent some time in England and became a strong advocate of the English constitutional system He founded two reviews, *Neue Deutsche Monatsschrift* (1795–98) and the *Historisches Journal* (1799–1800) The latter was the vehicle of English attacks against the Revolution He wrote several articles against the Revolution and was forced to leave the country because the government did not want to give up its strict neutrality He became an Imperial councilor in Austria in 1802. He was a bitter opponent of Napoleon and advocated the coalition with England against France In 1804 he wrote *Fragmente aus der Geschichte des politischen Gleichgewichts von Europa,* and he was the author of several of the proclamations directed against the French. After the Peace of Vienna, in 1809, Gentz dropped his liberalism and became the facile instrument of Metternich's reactionary policy He brought out, in 1818, a reactionary review, the *Weiner Jahrbucher der Litteratur,* and was the secretary of the Austrian plenipotentiaries at the congresses of Vienna (1815), Aix-la-Chapelle (1818), Troppau, Laibach, and Verona (1820–22) For these services he received large pecuniary rewards, which he squandered in dissipation He was a political thinker of some ability, and his classic and vigorous literary style made his services sought for, but he was always mercenary and wholly lacking in fixed principles He died at Vienna, June 9, 1832. His more important writings are contained in the collection ed by Weickz, *Ausgewahlte Schriften* (5 vols, Stuttgart, 1836–38), in the *Kleine Schriften,* ed by Schlesier (5 vols., Mannheim, 1838–40), and in the *Mémoires et lettres* ed. by Prokesch-Osten (4 vols, Vienna, 1873–74); also *Briefwechsel zwischen Friedrich Gentz und Adam Muller, 1800–29* (Stuttgart, 1857); and *Dépêches inédites du Chevalier de Gentz aux hospodars de Valachie 1819–28* (Paris, 1876). For his biography, consult Fournier, *Gentz und Cobenzl* (Vienna, 1880), Reiff, *Friedrich Gentz, an Op-*

ponent of the French Revolution and Napoleon (Urbana, Ill, 1912), Lubbe, *Friedrich Gentz und Heinrich von Sybel* (Gottingen, 1913)

GENTZ, WILHELM (1822–90) A German genre and landscape painter, noted for his delineations of Oriental subjects He was born at Neuruppin, Brandenburg, and studied at the Berlin Academy, under Kloeber, at the Academy of Antwerp, and in Paris under Gleyre and Couture He traveled widely through the Orient, then settled in Berlin in 1858 and began his remarkable delineations of life in the Orient His early pictures, biblical subjects with life-size figures, such as "Christ among the Pharisees and Publicans" (1857, Chemnitz Museum), met with scant appreciation, and even his Oriental scenes worked their way to success only gradually Gentz may be called the founder of the modern Berlin school of Oriental painting Although he was a skillful technician, he appears too dryly realistic when compared with the French masters, and lacks in harmony and animation Among the most prominent of his numerous paintings are "Transportation of Slaves through the Desert" (1860, Stettin Museum), "Funeral Rites near Cairo" (1872, Dresden Gallery), "Entry of the Crown Prince of Prussia into Jerusalem, 1869" (1876, National Gallery, Berlin), one of his masterpieces, for which he made special studies in Palestine in 1873, "Memorial Service at a Rabbi Grave in Algiers" (1881, Leipzig Museum), "Palm Sunday in Early Christian Times" (1886), "Evening on the Cataracts of the Nile" (1887) He also contributed illustrations to Ebers's *Egypt* and to some of his novels He was professor at the Berlin Academy and received gold medals at Vienna, Munich, and Berlin

GENUA. The ancient Roman name for Genoa (q v.).

GENUFLEX'ION (ML *genuflexio*, from Lat. *genuflectere*, to bend the knee, from *genu*, knee + *flectere*, to bend). The act of kneeling or bending the knees in worship While the common attitude of the Jews in prayer was standing, yet in times of special urgency or solemnity the suppliant sometimes knelt (1 Kings viii 54, Dan vi 10, Luke xxii 41, Acts vii. 60, ix 40, Phil. ii 10) That the use continued among the early Christians is plain from the *Shepherd* of Hermas, from Eusebius' *History*, and from numberless other authorities, and especially from the solemn proclamation made by the deacon to the people in all the liturgies—*Flectamus genua* (Let us bend our knees), whereupon the people knelt, till, at the close of the prayer, they received a corresponding summons—*Levate* (Arise) In celebration of Christ's rising from the dead the practice of kneeling at prayer, as early as the age of Tertullian, was discontinued throughout the Easter time and on all Sundays through the year. The kneeling posture was especially assigned as the attitude of penance, and one of the classes of public penitents in the early Church took their name, *genuflectentes*, from this circumstance The custom is a modification of the Oriental prostration, as an attitude of supplication or of reverence In the modern Roman Catholic church the act of genuflexion implies the highest form of worship and is frequently employed during the mass, as well as whenever persons enter or leave the church or pass in front of the altar on which the Blessed Sacrament is reserved, if it is publicly exposed, the genuflexion is made on both knees In the Anglican church the rubric prescribes the kneeling posture in many parts of the service, and this, as well as the practice of bowing the head at the name of Jesus, was the subject of much controversy with the Puritans

GENUNG, jē-nŭng', JOHN FRANKLIN (1850–1919) An American rhetorician and biblical scholar, born at Willseyville, N Y He graduated from Union College in 1870 and from Rochester Theological Seminary in 1875 and received the degree of Ph D from the University of Leipzig in 1881. He was a Baptist minister for several years, but after 1882 taught at Amherst College, becoming professor of literature and biblical interpretation in 1906 In 1911 he became editor of the *Amherst Graduates' Quarterly* His writings include *Practical Elements of Rhetoric* (1885, 4th ed, 1902), *The Study of Rhetoric in the College Course* (1887), *The Passing of Self* (1899), *The Working Principles of Rhetoric* (1901), a standard college text, *Ecclesiastes and Omar Khayyam* (1901), *Words of Koheleth* (1904), *The Hebrew Literature of Wisdom in the Light of Today* (1906), *The Man with the Pitcher and his Story* (1912)

GE'NUS, IN BIOLOGY See CLASSIFICATION OF ANIMALS

GENUS, IN LOGIC See PREDICABLES

GE'NU VAL'GUM. See KNOCK-KNEE

GE'NU VA'RUM, or BOWLEGS See LEG

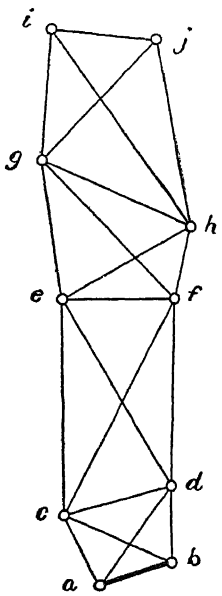
GE'OCEN'TRIC (from Gk γῆ, *gē*, earth + κέντρον, *kentron*, centre) A term used in astronomy to describe the motions and positions of the heavenly bodies such as they would appear to an observer at the earth's centre See HELIOCENTRIC

GE'ODES (Lat *geodes*, sort of gem, from Gk γεώδης, earthlike, from γῆ, *gē*, earth + εἶδος, *eidos*, form) Rounded hollow aggregates of mineral material, or indurated nodules, either empty or containing a more or less solid and free nucleus and having the cavity frequently lined with crystals They are sometimes called 'potato stones" on account of their size and shape The name seems to have been given them because they are occasionally found filled with a soft earthy ochre Agate is a geode built up of concentric layers of chalcedony

GEOD'ESY (from Gk γεωδαισία, *geōdaisia*, art of mensuration, from γῆ *gē*, earth + δαίειν, *daiein*, to divide) That science which deals with the size and shape of the earth In a geodetic survey the curvature of the earth is considered, and the exact horizontal locations of places on the earth are determined with relation to two great circles of the earth at right angles Those generally accepted are the equator and the meridian passing through the observatory at Greenwich, England The vertical location of a point is determined with relation to the surface of the geoid (see below)

In any accurate survey of the earth's surface it is necessary to know the relative positions of some points in order to control the detailed work. If the area is limited, the positions of these points may be determined by traverses, but if the survey extends over a large area or a great distance, such as a state or along the coast, the controlling points must have their relative positions determined by the method called *triangulation* It rests upon the mathematical principle that when three elements of a triangle are known, one being a side, the other three can be computed.

The usual procedure in triangulation is to measure directly a side of a triangle as a base, the line *a b* in the figure, and then to observe each angle in the scheme At the station *a* the angles *c a d* and *d a b*, at the station *b* the angles *a b c* and *c b d*, and at station *c* the angles *e c f*, *f c d*, *d c b*, and *b c a* are measured,



and so on throughout the whole network The triangulation may be carried on by a system of single triangles, but usually a double system is used, as shown in the illustration This insures greater accuracy and prevents mistakes In extensive triangulation additional lines are measured directly to give greater strength In each of the triangles *c b a* and *d b a* the measured line *a b* is used as the base, but for each of the other triangles the base is a computed length

Measurement of Bases The apparatus used for measuring a base has its length determined in terms of some standard unit, such as the foot or meter The earliest base measurements were made with wooden bars and glass tubes, but they were found to be unsatisfactory Later, bars of various metals were used A bar consisted of a small rod incased in wood or other material The single-rod bars were not very satisfactory, owing to the difficulty of obtaining the exact temperature during the measurements The best bars were composed of two rods made of metals, having a wide difference between their coefficients of expansion, which were fastened together in such a way as to make a metallic thermometer Some of these bars gave satisfactory results Nearly all measurements with bars were made in daylight A great advance in accuracy and economy was made when tapes and wires of steel and brass were substituted for bars in base measurements The field work was done with them at night when the temperature of the air is more constant and the temperature of the apparatus could be more accurately determined Wires and tapes were first employed on bases by Dr Edward Jaderin, of Sweden, about the year 1882. Metal tapes were first used in the United States on primary base measurements in 1891 on the Holton base in Indiana by Prof R S Woodward of the Coast and Geodetic Survey He made elaborate tests and proved that the tapes, which were of steel gave as accurate results as the best bars

All nations are now measuring primary bases with tapes or wires made of the alloy of nickel and steel called *invar*, which has a coefficient of expansion as low as one twenty-fifth that of steel It is not necessary to obtain the temperature of the apparatus with extreme accuracy, therefore measurements can be made during the day A base can be measured with invar apparatus with an accuracy greater than one part in one million Therefore the uncertainty in a base 10 kilometers in length is less than 10 millimeters

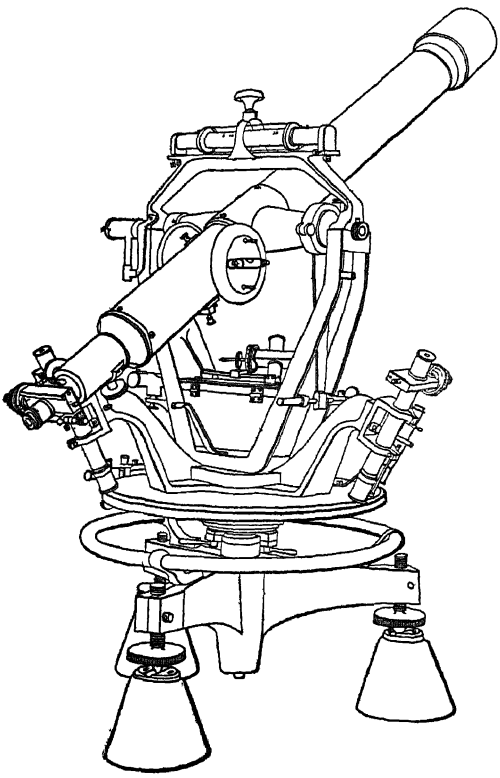
Tapes and wires of various lengths are used, but they are seldom more than 50 meters long The apparatus has a single line or a scale at each end The length of the tape or wire is the straight-line distance between the zero lines at the two ends, while the apparatus is supported at a certain number of points, under a definite tension and at a given temperature The length is found by comparison, in a vault of constant temperature, with a standard bar whose length in meters, feet, or some other unit, is known

The measurement in the field is made with the same number of supports and at the tension used during the standardization The apparatus is supported by stakes driven into the ground or by portable tripods The zero mark at one end of the tape or wire is placed in contact with one end of the base line, and, with the tension applied, the zero of the other end is transferred to the forward support The apparatus is then moved forward, the rear zero is placed in coincidence with the mark on the support, and the tape length is transferred to the second support This procedure is continued throughout the whole base One or more additional measurements are made to increase the accuracy The inclination of each tape or wire length is determined by spirit levels, and the measurement is reduced to a horizontal distance Since in triangulation all lengths are referred to the sea-level surface, a correction must be applied to the measured length of the base, to obtain the distance at sea level between the verticals through the two base ends

Measurement of Horizontal Angles Triangulation is classified as primary, secondary, and tertiary, according to the accuracy of the measured bases and angles Primary triangulation is usually considered to be that grade which has an average probable error of about one part in one million in the base measurements and an average closing error of triangles of about one second of arc The closing error of a triangle is the difference between 180° and the sum of its three measured angles, but in large triangles the spherical excess is taken into account Primary triangulation is used to extend the control over large areas, tertiary triangulation furnishes the detailed control for surveys and maps, and secondary triangulation is employed to connect the tertiary and primary schemes (See SURVEYING)

The angles for primary triangulation are measured with a large theodolite It consists of a horizontal circle, divided usually into five-minute spaces, mounted upon a base, and an alidade supporting the telescope and several micrometer microscopes The telescope is pointed on the distant stations in turn, and for each

pointing the position of the telescope is determined by readings of the circle by the microscopes The angle formed by any two lines is obtained from the recorded circle readings The measurements are repeated many times to lessen the effect of errors of pointing and reading For each series of observations the readings are made on different parts of the circle to eliminate accidental and periodic errors of graduation The use of two or more microscopes equally



THEODOLITE

spaced eliminates the errors due to any eccentricity of the centres of the alidade and of the circle

The observations in daylight are made upon poles, various kinds of targets, or heliotropes accurately centred over the distant stations. The heliotrope is a small plane mirror by which the sun's rays are reflected towards the observer At night the observations are made on lamps set over the stations The most successful lamp for long lines is an acetylene searchlight In 1910 and 1911 such lamps were used on triangulation in New Mexico and Arizona for lines more than 100 miles in length

Geographic Positions. In addition to the measurement of the bases and angles, it is necessary to determine by astronomic observations the latitude and longitude of some one station and the true azimuth, or direction, of a line of the triangulation The azimuth is expressed as the horizontal angle between the line and the plane of the meridian through the station Then an ellipsoid is selected which closely represents the mean shape and size of the earth The geographic positions of the various stations of the triangulation can then be computed from the initial station which was located astronomically In a continuous network of triangulation, with the geographic positions of all points referred to this initial station, the relative positions of even the most widely separated points are correct, but, on account of the phenomenon called *deflection of the vertical*, the whole network may not be in its true position on the earth's surface with relation to the equator and the Greenwich meridian In order to appreciate the effect of the deflection of the vertical and the method of eliminating it, we must consider the actual water surface and the ellipsoidal surface

If we imagine a network of sea-level canals extended over the continents and the cessation of the movement of the oceans represented by tides, then the surface of the oceans and of the water in the canals would define an equipotential surface called the geoid This surface would be irregular, but its mean would be an ellipsoid of revolution, a regular geometric figure Owing to the material above sea level on the continents and to the deficiency of mass in the oceans, the geoid surface over the water would be below the ellipsoidal surface, at or near the seacoast the actual water surface and the mean surface would intersect, while within the continental areas the geoid would be above the mean surface The greatest separation would occur under the largest mountain masses and over the deepest parts of the oceans The direction of the plumb line at a point on the earth's surface is normal to the geoid surface and is not coincident with the normal to the ellipsoid at that point unless the two surfaces there coincide or are concentric. As the astronomic latitude of a station is the angle between the plumb line and the plane of the equator, and the astronomic longitude the angle between the initial meridian and the meridian at the station, it is evident that the astronomic observations at the station may not give its true geographical position with relation to the position of some distant point, also determined astronomically The island of Porto Rico furnishes a notable example of this phenomenon At two stations on the north and south coasts accurate determinations of the astronomic latitudes were made from which the width of the island was computed These stations were later connected by triangulation which gave the *true* distance between them, and it was found that the two distances differed by more than one mile. The angle formed at a point by the normals to the ellipsoid and to the geoid is called the *station error*, or *deflection of the vertical* See DEFLECTION OF THE PLUMB LINE

The astronomic determinations at a single station cannot be used as the datum for a large area like the United States Therefore geodesists have determined the astronomic positions of many triangulation stations and then, by the method of least squares, have computed the mean position of the initial station, which brought the astronomic and geodetic data, as a whole, into close agreement The geodetic bureaus of the United States, Canada, and Mexico have adopted for their triangulations the North American Datum, which is the computed latitude (39° 13′ 26 686″), longitude (98° 32′ 30 506″), and azimuth (to Waldo triangulation station, 75° 28′ 14.52″) at the triangulation station Meades Ranch, Kans Points are said to be on the North American Datum (called the United States Standard Datum before its recent adoption by Mexico and Canada) when they are connected with the station Meades

Ranch by continuous triangulation, through which the corresponding latitudes, longitudes, and azimuths have been computed on the Clarke spheroid of 1866, expressed in meters, starting from the above data

Elevations The elevations of points back from the coasts are determined by geodetic spirit leveling in which the curvature of the earth is considered The elevations are referred to the sea surface, the *geoid*, not to the mean surface, the *ellipsoid* The mean sea level at the starting points of the lines of levels is determined by long series of tidal observations

Mapping After the triangulation and geodetic levels cover an area it is a simple matter for the surveyor to fill in the topographic details in their proper horizontal and vertical positions See SURVEYING

Figure of the Earth The determination of the shape and size of the earth would be a simple problem if the water surface were a regular geometric figure, for then it would only be necessary to measure accurately the distances between each two of several points located on a meridian and to determine the astronomic latitude of those points But the earth's water surface (see above) is an irregular one The problem is to determine the dimensions of the mean surface which most closely fits the actual one For this purpose many arcs measured by connected triangulation, covering a large area, are necessary, with determinations of the astronomic latitude and longitude of many of the stations and the astronomic azimuth of a number of lines of the triangulation A least square solution of the data furnishes corrections to the dimensions of the provisional ellipsoid on which the triangulation was computed After these corrections have been applied a new figure of the earth is obtained

The theory of *isostasy* was taken into consideration by the United States Coast and Geodetic Survey in its recent determination of the figure of the earth, conducted under the direction of Prof John F Hayford This theory postulates that at and below a certain depth (found to be about 122 kilometers below sea level) the earth's materials are in hydrostatic equilibrium In consequence the vertical pressures on unit areas at that depth are the same at all points Therefore, under the continents the lithosphere has deficiencies of density and under the oceans excesses of density These deficiencies and excesses of matter exactly balance the materials above sea level on the continents and the deficiencies of matter in the oceanic volumes Investigations prove this theory to be substantially true Before making the computations which gave the dimensions of the mean figure of the earth, the direction of the plumb line (or vertical) at each astronomic station was corrected for the attraction, positive or negative, of the masses above sea level, the deficiency of matter in the oceans, and the deficiencies and excesses within the lithosphere See ISOSTASY

The resulting values for the dimensions of the earth have greater precision than those previously found, and are equatorial radius, 6,378,-388 meters, polar semidiameter, 6,356,909 meters, reciprocal of the flattening, 297 0.

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GEODETIC SURVEY, UNITED STATES See COAST AND GEODETIC SURVEY, UNITED STATES

GEOFFREY (jĕf'rĭ) **CRAY'ON, GENT** See CRAYON.

GEOFFREY DE VINSAUF. See VINSAUF, GEOFFREY DE

GEOFFREY OF MONMOUTH, mŏn'mŭth (c 1100–1154) A Welsh chronicler, born at Monmouth, Wales Little is known of his life, except that he obtained the archdeaconry of Llandaff about 1140, was consecrated Bishop of St Asaph in 1152, and died probably in 1154 He is the author of a famous book in Latin called *Historia Regum Britanniæ* (History of the Kings of Britain), which was in circulation as early as 1139 and assumed its final shape about 1147. The book purports to be a translation from an ancient Kymric chronicle, which Walter, Archdeacon of Oxford, brought over from Brittany and communicated to Geoffrey As to how much truth there may be in the statement, scholars do not agree It has been shown that some parts are merely amplifications of the *Historia Britonum*, attributed in its earliest form to a certain Nennius (fl. 796) But for other parts no sources have been discovered. The book can hardly be regarded as a fabrication by Geoffrey, for it undoubtedly rests upon a mass of Kymric traditions which may have already assumed the form of a saga Geoffrey gives the history of the kings of Britain from Brutus, the great-grandson of Æneas, down to Cadwallader, who at length, defeated by the Saxons, flees to Armorica and then to Rome, where he dies In the line of kings are Gorboduc, Cymbeline, and Lear The story of the latter is related at large Geoffrey's history is also one of the main sources (though not the only source) of the Arthur legend, and, as such, it is of the highest interest and value Arthur indeed had been mentioned earlier, in Nennius he appears as a leader of the Britons (*dux bellorum*) in 12 great battles against the Saxons, and in William of Malmesbury's *Gesta Regum Anglorum* (1125) there are allusions to fables concerning Arthur But in Geoffrey first appears the Arthur legend somewhat as we now know it Under the title of *Brut* (1155), Geoffrey's *History* was translated, with additions, into French verse by an Anglo-Norman poet named Wace This version was rendered into English, with other additions, by Layamon in a poem also entitled *Brut* (about 1200) The critical edition is by San Marte (Halle, 1854) For English translation, consult Thompson, *Geoffrey of Monmouth*, ed. by Giles (2d ed, London, 1842), *Geoffrey of Monmouth*, trans by S Evans (London, 1904; new ed, 1911) For criticism and biography, consult Ulbrich, "Ueber das Verhältnis von Waces Roman de Brut zu seiner Quelle des Gottfrid

von Monmouth Historia regum Britanniae," in *Romanische Forschungen*, vol xxvi (Erlangen, 1909), Maclean, *The Literature of the Celts* (Glasgow, 1906), Rhys and Brynmor-Jones, *The Welsh People* (London, 1909) See ARTHUR

GEOFFRIN, zhō'frăN', MARIE THERÈSE (1699–1777) A wealthy patroness of letters, who inherited the famous salon of Madame de Tencin Her hospitality and liberality to men of letters earned her eulogies from D'Alembert, Thomas, and Morellet (*Eloges sur Mme de Geoffrin*, Paris, 1812) To the *Encyclopédie* of D'Alembert and Diderot (q v) she contributed 100,000 francs She died in Paris Her correspondence with Prince Stanislas Auguste Poniatowski, later King of Poland, published in 1878, makes very interesting reading Consult Ségur, *Le royaume de la rue Saint-Honoré, Mme Geoffrin et sa cour* (Paris, 1897), and Janet Aldis, *Mme de Geoffrin Her Salon and her Times* (New York, 1905)

GEOFFROY, zhō'frwa', JEAN (1853–) A French figure painter, born at Marennes (Charente-Inférieure). He studied under Levasseur and Eugène Adan and first exhibited in 1874. His paintings and illustrations depict chiefly childhood and poverty Good examples are "The Unfortunates," Amiens Museum, "Visiting Day in the Hospital," in the Luxembourg, and "The Prayer of the Humble," all sympathetically painted in a low key with much charm and sincerity. He received a gold medal at the Paris Exposition in 1900

GEOFFROY, JULIEN LOUIS (1743–1814) A French dramatic critic, born at Rennes He studied to join the Order of the Jesuits, but upon its suppression became a teacher. He edited the *Année Littéraire* (succeeding the younger Fréron) and the Royalist *Journal de Monsieur* and *L'Ami du Roi* (1790–92), and during the Revolution he was obliged to live in retirement In 1806 he began his connection with the *Journal des Débats* (for a time called the *Journal de l'Empire*) as dramatic critic He was a most vigorous opponent of eighteenth-century ideas, and Voltaire was his especial detestation, but, despite his narrowness, bitterness, and inordinate love of the classic, he had solid learning and a powerful pen. His daily criticisms were collected by Gosse under the title *Cours de litterature dramatique* (1819–20) He also wrote, among other volumes, *Discours sur la critique* (1779)

GEOFFROY DE VINSAUF, *de* văN'sōf' See VINSAUF

GEOFFROY SAINT-HILAIRE, săN'tē'lâr', ETIENNE (1772–1844) A French zoologist, born at Etampes, France. He studied with Brisson, Hauy, and Daubenton. In 1793, when only 21 years old, he became professor of vertebrate zoology in the newly instituted Museum at Paris and began to make the famous collection of animals in the Jardin des Plantes In 1794 he invited Cuvier to Paris, and the two men became thenceforth associates in the field of natural history. In 1798 Geoffroy accompanied Bonaparte to Egypt, where he remained three years In 1807 he became a member of the Académie des Sciences and in 1809 professor of zoology in the Faculté des Sciences Geoffroy Saint-Hilaire was by nature a philosopher and by education an anatomist, and in his speculations held that a single plan of structure prevails throughout the animal kingdom. In this he was violently opposed by Cuvier, who was an empiricist and not a philosopher, and who maintained that four distinctively different types of structure were present The two naturalists differed also in their conception of the mutability of species, Geoffroy arguing for it and Cuvier against it He raised teratology, or the study of monstrosities, to the rank of a science Of his many works, we may mention *Philosophie anatomique* (1818–20), *Sur l'unité de composition organique* (1828), *Principe de philosophie zoologique* (1830), *Etudes progressives d'un naturaliste* (1835), *Notions synthetiques, historiques et physiologiques de philosophie naturelle* (1838) For his views on species, and the relation he bore to Lamarck and the agitation leading towards the announcement of the hypothesis of evolution, consult Packard, *Lamarck His Life and Work* (New York, 1901), and *Life of Geoffrey*, by his son (Paris, 1847)

GEOFFROY SAINT-HILAIRE, ISIDORE (1805–61) Son of Etienne A French zoologist He was born in Paris, became assistant at the Museum of Natural History in 1824, and received a medical degree in 1829 He became professor of zoology in the Museum in 1841 and in the Faculté des Sciences in 1854, and in the same year he founded the Societé d'Acclimatation He wrote a life of his father, and also *Histoire generale et particuliere des anomalies de l'organisation chez l'homme et les animaux* (1832–37) and *Histoire naturelle* (1854–62)

GEOG'NOSY (from Gk γῆ, *gē*, earth + γνῶσις, *gnōsis*, knowledge) A study of the materials of which our planet consists The term is not synonymous with geology, which concerns itself not only with the materials of the earth, but with theories as to their arrangement, succession, and development As applied to rocks, the term "geognosy" is now superseded by "petrography" See GEOLOGY

GEOGRAPHICAL BOTANY. See DISTRIBUTION OF PLANTS

GEOGRAPHICAL DISTRIBUTION OF ANIMALS. See DISTRIBUTION OF ANIMALS

GEOGRAPHICAL SOCIETY, AMERICAN A society, organized in 1852, for the investigation and dissemination of geographical knowledge by discussion, lectures, and publication, for the encouragement of geographical exploration and discovery, and for the establishment in the chief maritime city of the United States, for the benefit of commerce and navigation and the great industrial and material interests of the country, of a place where the means shall be afforded of obtaining correct information for public use concerning every part of the globe The society maintains a large library, containing about 50,000 volumes Two gold medals are awarded yearly at the discretion of the executive council These medals are bequests from General Cullum and Charles P Daly and are called the Cullum and Daly medals respectively. In 1911 a new building for the society, erected at a cost of $300,000, was completed It was erected in New York City, at Broadway and 156th Street, on land which was the gift of the family of the late Collis P Huntington The building is equipped with the most modern appliances for research and includes rooms for the editorial and library force, the map floor, and drafting room, besides accommodations for meetings in the social life of its members The society issues a monthly *Bulletin*, containing geographical news, original papers, and critical

and bibliographical departments The collections are open for free reference to the public The membership in 1914 was about 1200

GEOGRAPHICAL SOCIETY, ROYAL See ROYAL GEOGRAPHICAL SOCIETY

GEOGRAPHICAL SOCIETY OF PHILADELPHIA The Geographical Society of Philadelphia had its inception in 1891 Two years later a charter was granted to the Geographical Club of Philadelphia, of which Angelo Heilprin was first president In 1897 the society assumed its present title It has contributed to the extension of geographical knowledge by supplying funds to exploring expeditions, by issuing a bulletin at intervals during the year, and through its library The society confers annually a gold medal—known as the Elisha Kane medal—as a reward for eminent geographical work It has been awarded in turn to Dr A Donaldson Smith, Rear Admiral R E Peary, U S N, Prof Angelo Heilprin, Capt Robert F Scott, R N, Prof William B Scott, Capt Roald Amundsen, Dr Sven Hedin, Sir Ernest H Shackleton, Rear Admiral George W Melville, U S N, and Prof William Morris Davis The membership in 1914 numbered 991

GEOGRAPHIC NAMES, UNITED STATES BOARD ON An organization for the purpose of introducing uniformity in the orthography of geographic names, instituted in 1890 by President Harrison, at the instance of a number of the government departments. The arbitrary manner in which geographic names were spelled and pronounced prior to that time resulted in considerable confusion, particularly in the Post-Office Department, where names were often assigned to stations not at all in accord with common usage The transliteration of Indian names and the Russian nomenclature in Alaska were also found to be misleading To remedy these evils this board, at first a voluntary organization, was instituted with power to make final decision, binding upon all departments of the United States government in cases where there existed a divergence in the spelling of geographic names The board consists of 15 members, representing the executive departments, the Smithsonian Institution, and the Government Printing Office The board aims, as a rule, to follow local usage and to simplify names by dropping unnecessary letters, syllables, and the combination of compounds By executive order, dated Jan 23, 1906, there was added to the duties of the board the determining, changing, and fixing of place names within the United States and insular possessions, and it was also decided that all names hereafter suggested for any place by any officer or employee of the government shall be referred to said board for its consideration and approval, before publication In 1898 the board was called to decide upon an extensive list of geographic names in the Philippines, but at present there is an independent board of geographic names in the Philippines. Also there is an advising committee on native names in Hawaii, whose reports are passed upon by the United States Board The board's reports have been published by direction of Congress

GEOGRAPHIC POSITIONS. See GEODESY

GEOGRAPHIC SOCIETY, NATIONAL A society, founded in 1888, at Washington, D C, with the object of collecting and diffusing geographic knowledge chiefly through its official organ, the *National Geographic Magazine.* The society maintains research work, both independently and in connection with other organizations and institutions The society has organized or participated in scientific and exploring expeditions in Alaska, South America, and the Hudson Bay region The results of these explorations are published in the *National Geographic Magazine* The society has a membership of about 300,000 It occupies its own building in Washington and maintains an excellent library, containing about 50,000 volumes A course of 20 lectures is given by the society from November to April in each year

GEOGRAPHY (Lat *geographia*, Gk γεωγραφία, from γεωγράφος, *geōgraphos*, geographer, from γῆ, *gē*, earth + γράφειν, *graphein*, to write) Geography is the science which deals with the phenomena of the earth's surface, their distribution and their interaction upon each other Inasmuch as the influence of the phenomena upon man is the most important phase of geographical inquiry, the subject may also, following Mackinder, be defined as the study of the earth as the home of man Up to 30 or 40 years ago, geography was confined, in the main, to a bald description of the earth, its phenomena, its countries, and its inhabitants It comprised little more than a collection of facts Since then, however, it has advanced greatly, especially in the study of the causes of phenomena Modern geography is not merely descriptive, but interpretative

The subject may be divided into general geography and regional geography General geography deals with the general principles of the subject, as deduced from phenomena from all over the world. Regional geography portrays the geography of a definite region, large or small, by systematically applying these principles to it General geography may be conveniently subdivided into three large divisions—mathematical geography, physical geography, and biogeography

Mathematical geography treats of the form, size, and movements of the earth, and herein is connected closely with astronomy, it also deals with the methods of delineating the earth's surface, and hence includes geodesy, surveying, and cartography

Physical geography treats of the three layers of the earth's surface—the lithosphere, hydrosphere, and atmosphere, or the land, sea, and air It discusses the land forms and the forces that shape them (this subdivision of physical geography is generally termed physiography and touches closely upon the domain of geology) as well as the hydrography of the land—its lakes and rivers, it investigates the ocean and its phenomena—physical properties of the water—waves, tides, and currents (this subdivision is termed oceanography) and, finally, it deals with the phenomena of the air—temperature, atmospheric pressure, winds, and precipitation (the subject matter of meteorology and climatology).

Biogeography treats of the living organisms of the earth's surface It discusses the distribution and life conditions of plants (phytogeography), animals (zoogeography), and man (anthropogeography). In view of the fundamental difference between the nonintelligent organisms, plants and animals, on the one hand, and man on the other, phytogeography and zoogeography are often classified as subdivisions of physical geography, and anthropogeography, or the geography of man, is considered by itself one of the three major divisions of the

subject The geography of man discusses the races of man and their cultural divisions, linguistic and religious, it discusses the distribution and density of population and the various types of human occupations—fishing, hunting, pasturing, agriculture, mining, manufacture, and commerce On account of its intrinsic importance that subdivision of human geography which deals with man's industries has been especially well developed It is generally termed economic geography it treats of natural products and raw materials, of manufactures, by which their forms are changed, and of trade and transportation, or commerce by which commodities are exchanged Because of the emphasis laid on the last factor, this subdivision of human geography is often styled commercial geography Another phase of human geography has also received special attention, viz, man's adaptation to his environment This specific application to human affairs of the modern geographical principle of interaction is termed anthropogeography, in this sense the term is therefore more restricted than when used to denote human geography as a whole.

MATHEMATICAL GEOGRAPHY

Astronomy and Geodesy. The form of the earth is spherical, with a slight flattening at the poles Its equatorial diameter is 7926, and its polar diameter 7900, miles, the difference between them, 26 miles, measuring the eccentricity. This flattening of the earth at the poles is a necessary consequence of the earth's rotation about its axis See EARTH

The chief method employed in the determination of the size and form of the earth may be explained in general terms without going into details The latitudes and longitudes of two points, widely separated, are determined by astronomical means, and the direct distance between them is measured by geodetic methods. A comparison of the two methods gives the length of a degree, or series of degrees, of latitude and of longitude. Such arcs have been measured in various parts of the earth, from northern Africa northward across Europe, in India, in the Andes of South America, across the United States from east to west, and southwest from New England to the Gulf coast

Latitude is distance north or south of the equator expressed in terms of the angle subtended at the earth's centre. It is determined by measuring the angle of elevation of the sun or of any star whose position is known, when crossing the meridian of the place of observation; or, most accurately, by measuring the difference between the zenith distances of two stars, whose position is known, such measurements being made by zenith telescope. Longitude is distance east or west of a selected meridian, expressed in terms of the angle subtended at the earth's axis. The meridian of the observatory at Greenwich, England, has been almost universally adopted as the initial point for the statement of longitudes. Difference of longitude is difference of time. Since the earth revolves on its axis, i.e., turns, 360° once in 24 hours, an hour corresponds to 15° of longitude Hence, in order to determine the difference of longitude between two places it is only necessary to determine and compare the local sidereal times of those two places The determination of time is made by observing, with a transit instrument and chronometer, the passage across the meridian of stars, whose position is known The observed sidereal times of their passage, or transit, compared with their right ascensions, gives the error of the chronometer, and hence the true sidereal time Local sidereal time of the two places is compared by the use of the telegraph See LATITUDE AND LONGITUDE, DEGREE OF LONGITUDE.

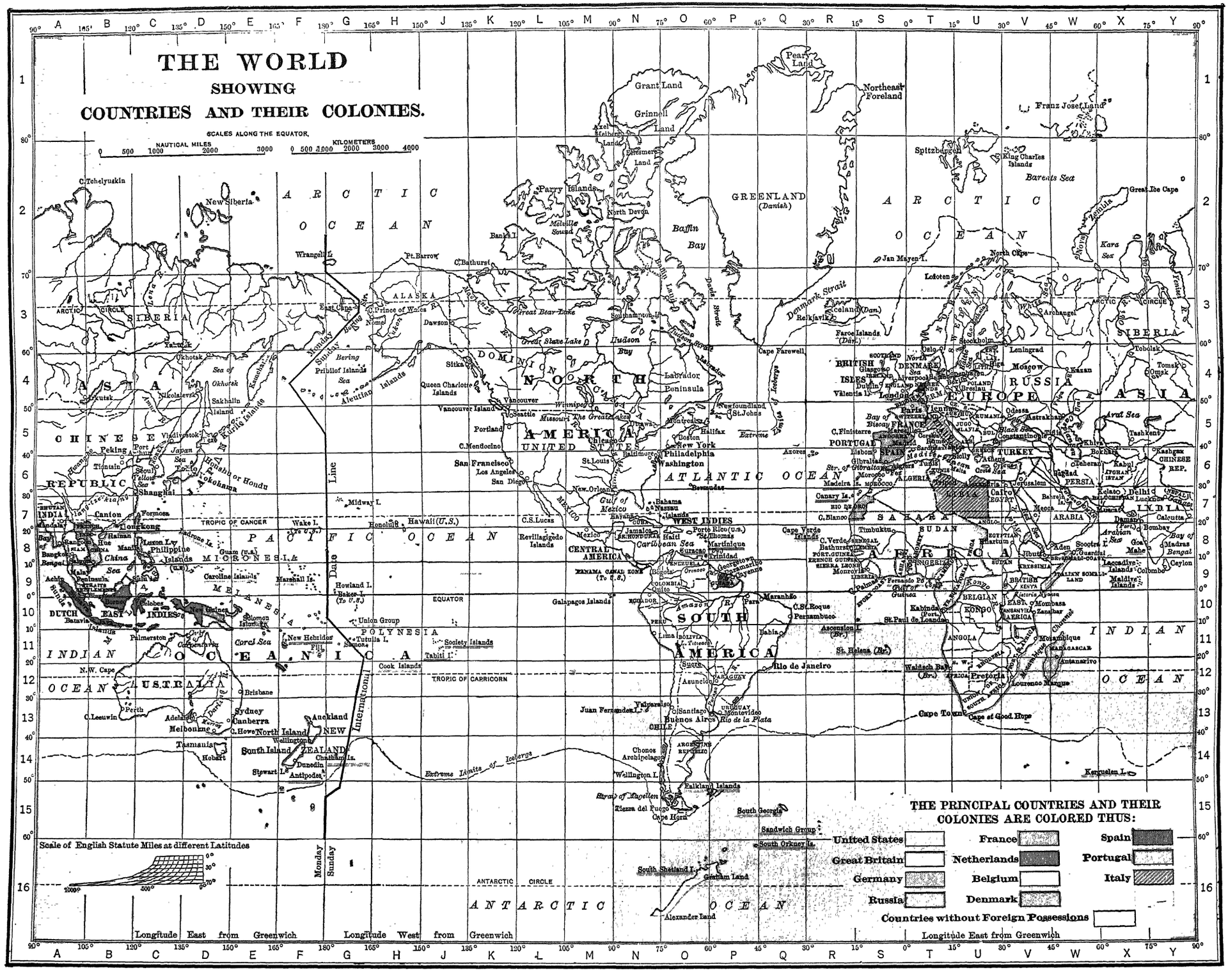
Measurements of distance on the earth's surface are commonly made by triangulation A base line, 2 to 5 miles long, is first measured directly, using steel wire, or tape, or bars Angles are measured at each end of the base, between the other end and certain signals erected to the right and left, and from these signals the third angle of each triangle is measured Then, with the angles and one side known in each triangle, the other sides may be computed, and these in turn become the bases for other triangles, as the work is extended See ASTRONOMY, GEODESY

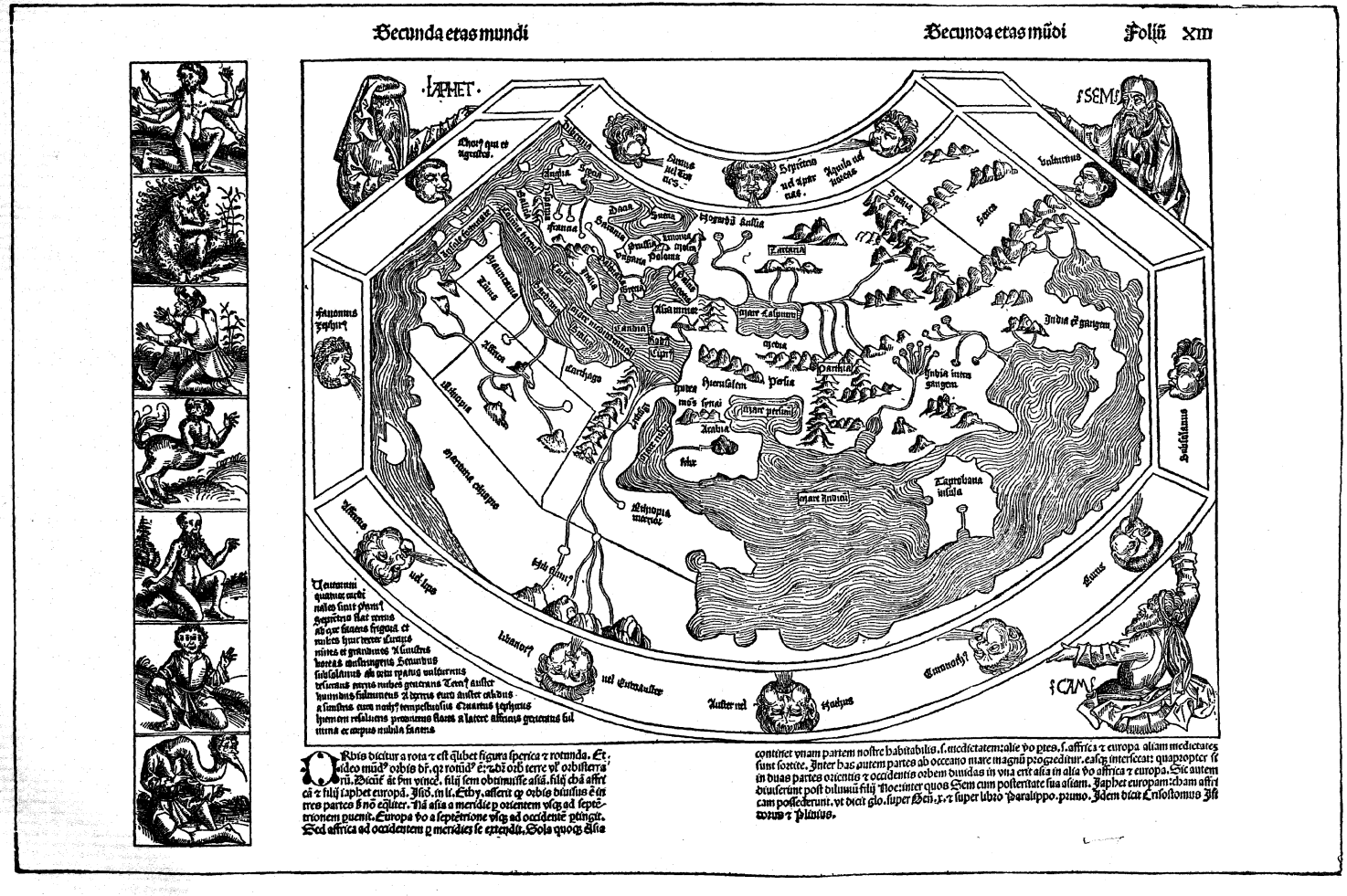
The plane of the earth's orbit about the sun, known as the ecliptic, is inclined to the earth's equator at an angle of 23° 28′ Hence, in the course of the year the sun apparently moves north and south through an angle of 46° 56′, the equator being in the middle The sun reaches its most northern position, which is known as the tropic of Cancer, about June 21, and its most southern point, the tropic of Capricorn, about December 21, passing the equator about March 21 and September 21 This apparent movement of the sun causes the change of seasons

There is an area about each of the poles of the earth where in midwinter the sun fails to rise above the horizon, even at midday, and where in midsummer it does not sink below the horizon, even at midnight The circles bounding these areas are the polar circles, and the areas are the polar zones, distinguished as the Arctic and Antarctic. The areas lying between the polar circles and the tropics are the temperate zones, and that lying within the tropics the torrid zone

Cartography —Maps are representations, commonly upon flat surfaces, of all or parts of the earth's surface The scale of a map is the relation which distances on the map bear to distances upon the area represented They may be expressed in terms of miles or kilometers on the ground to an inch on the map, or by a fraction, as $\frac{1}{100000}$, or 1 : 100,000, in which the numerator refers to the distance on the map, and the denominator to that on the ground, both being expressed in the same units, as feet, meters, or miles The last is known as the natural scale. A third method is by the linear scale, in which actual measurements are drawn on the map and marked with the distances which they represent in nature

Maps may be classified in accordance with the kind of information which they present Thus, there are geological, climatic, and statistical maps The maps considered here, however, are those only which represent the topographical features proper, the streams and other bodies of water, the relief of the country, its mountains, valleys, and plains, and the culture or the works of man, the cities, roads, railroads, boundaries, etc Restricted to this definition, maps may be classified as (1) plans, which are upon large scales and represent limited areas, such as a city or township, (2) topographic maps, upon smaller scales, say from 1 to 8 miles to an inch and covering much larger


THE WORLD
SHOWING
COUNTRIES AND THEIR COLONIES.
SCALES ALONG THE EQUATOR.
NAUTICAL MILES
KILOMETERS
ARCTIC OCEAN
ATLANTIC OCEAN
PACIFIC OCEAN
INDIAN OCEAN
ANTARCTIC OCEAN
GREENLAND (Danish)
NORTH AMERICA
UNITED STATES
SOUTH AMERICA
AFRICA
EUROPE
ASIA
RUSSIA
SIBERIA
CHINESE REPUBLIC
AUSTRALIA
NEW ZEALAND
DUTCH EAST INDIES
MICRONESIA
MELANESIA
POLYNESIA
WEST INDIES
CENTRAL AMERICA
SAHARA
SUDAN
ARABIA
PERSIA
INDIA
TURKEY
BRITISH ISLES
FRANCE
SPAIN
PORTUGAL
ALASKA
DOMINION OF CANADA
ARCTIC CIRCLE
TROPIC OF CANCER
EQUATOR
TROPIC OF CAPRICORN
ANTARCTIC CIRCLE
Longitude East from Greenwich
Longitude West from Greenwich
Longitude East from Greenwich
Scale of English Statute Miles at different Latitudes
THE PRINCIPAL COUNTRIES AND THEIR COLONIES ARE COLORED THUS:
United States
Great Britain
Germany
Russia
France
Netherlands
Belgium
Denmark
Spain
Portugal
Italy
Countries without Foreign Possessions


Secunda etas mundi
Secunda etas mūdi
Folīū XIII
IAPHET
SEM
CAM
Hispania
Gallia
Germania
Dacia
Sarmatia
Scythia
Tartaria
Asia minor
Mare Caspium
Arabia
Persia
Parthia
India inter gangem
India et gangem
Ethiopia
Mare Rubrum
Taprobana insula
Mare Indicum
Africa
Libia
Mauritania
Mare Mediterraneum
Hierusalem
Aethiopia
Aethiopia occidens
Aethiopia oriens
Mare Oceanum
Auster vel Austrinus
Euroaquilo
Aquilo vel Boreas
Septentrio vel aparctias
Zephirus
Favonius
Subsolanus
Volturnus
Austroroos
Austrinus
Euroaquilo
Auster vel Austrinus
Africus
Caurus
Corus
Circius
Aquilo
Vulturnus
Subsolanus
Favonius
Auster

gravel, and other detritus Strains in the earth's crust, produced perhaps by shrinking of the interior on cooling, result in folds and breaks in the crusts These may be of small extent, producing mountain ridges, or they may involve large parts of the earth, resulting in raising continents above the sea They may be low and flat, or they may be high and sharp, even to so great an extent that the sides of the fold pass beyond the vertical (See FAULT, ANTICLINE, SYNCLINE) Lava flows out from vents and spreads over great areas, or it may be forced in between beds of stratified rock, or, in a plastic state, be forced up through such beds

No sooner has a region been uplifted than the agencies of erosion, always at work, attack it with renewed activity Water percolates into the seams and crevices of the rocks, and, freezing, splits them into fragments by its expansion. Water, often with acids in solution, dissolves the soluble portions of the rocks and thus disintegrates them Flowing water, glacial ice, and the wind wear the rock away The rock waste thus produced is transported, always downward, by the winds, streams, glaciers, and its own weight, most of it having the sea bottom as its ultimate destination On the way, however, some of it is deposited, as in dunes, moraines, and deltas, and thus the agencies of destruction are also constructive agents Thus there is a constant movement downward, from the land to the sea. Unless this is offset by elevation movements in the crust of the land, it results eventually in the reduction of the land to a low plain Furthermore, if the limits of sea and land remain constant, there is a vast accumulation of sediment on the sea bottom, and a corresponding thinning of the solid crust over the land See PHYSIOGRAPHY, GEOLOGY

Hydrosphere. The sea, including the Pacific, Atlantic, Indian, and Arctic oceans, with many great gulfs and bays, covers 72 per cent of the earth's surface Of these the Pacific is far the largest, comprising much more than half the water surface of the globe The average depth of the sea is about 2½ miles, or 13,200 feet. The greatest depth yet measured in the Atlantic, at a point north of the West Indies, is 1660 fathoms This depth is considerably exceeded in the Pacific, where, in the Philippine Trough, to the east of Mindanao, a sounding of 9788 meters, or 32,114 feet, has been obtained See OCEAN, ATLANTIC OCEAN; ETC

The water of the ocean is strongly saline, being supplied constantly by streams whose waters contain saline material in solution in greater or less amount Even if the amount be trifling, since there is no outlet save evaporation, its degree of salinity is merely a question of time The salinity of certain landlocked seas, situated in hot regions, such as the Red Sea and the Mediterranean, is greater than that of the open ocean, owing to excessive evaporation from their surfaces.

The temperature of the surface water ranges from the freezing point in Arctic regions to 90° in landlocked seas, in the tropics, such as the Red and Caribbean seas The annual range of temperature at the surface is small, except in localities where currents change their positions with the seasons At moderate depths there is no change of temperature throughout the year, and at great depths the temperature in all parts of the sea is very nearly the same, being but little above the freezing point.

The surface waters of the sea are disturbed by waves and tides and moved about by currents and drifts Waves are set in motion by the wind, but have little movement of translation, consisting mainly of vertical oscillations They are rarely ¼ of a mile in length from crest to crest, and 50 feet in height The tides (q v) are oscillations in the sea surface, occurring twice a day, one of them following the passage of the moon across the meridian, the other nearly 12 hours later They are slight in the open sea, being not more than 2 or 3 feet, but upon the seacoast they are commonly much higher, and at the heads of funnel-shaped bays are in many cases very high The tides are due to the difference in the force of attraction, mainly of the moon, upon the surface of the earth and its centre, owing to their difference in distance from it Drifts are surface water transported by the wind The movement is commonly very slow and changes in direction with the wind When driven by constant winds, such drifts do in some cases develop into currents (See OCEAN CURRENTS) The great ocean currents, such as the equatorial currents, the Gulf Stream (q v), and the Japan current, thus originate The constant trade winds, blowing from the northeast and the southeast diagonally towards the equator, induce great drifts in these directions These, meeting near the equator, flow westward across the oceans See HYDROGRAPHY

Atmosphere The height of the atmosphere is unknown, but from the rate at which its density diminishes with altitude above the earth's surface, it is clear that in a few miles it becomes extremely rare, so rare that its effects may be neglected The pressure of the atmosphere at sea level has an average value over the earth of 14 pounds per square inch, equivalent to about 30 inches of the mercurial column In equatorial regions the pressure is slightly below, and in temperate regions slightly above, this average See AIR, ATMOSPHERE, BAROMETER.

Heat is produced by the absorption of the sun's rays by the earth The more nearly overhead the sun is, the more heat is received per unit of area, and the higher is the temperature, other things being equal The degree of temperature at the earth's surface is, however, affected by other conditions, chief among which is the relative moisture of the air, since a moist air absorbs much of the heat before the rays reach the earth Hence very high temperatures are not observed in moist equatorial regions, while in desert regions extraordinarily high temperatures have been observed On the whole, however, the equatorial regions receive the greatest amount of heat, and the polar regions the least Hence the air over the equator rises, being forced upward by the pressure of air on the north and south. This produces a flow of air towards the equator from both sides—a flow which would be directly south and north were it not for the rotation of the earth, which deflects the currents to the westward and thus produces the well-known uniform trade winds. (See WIND) The land absorbs heat rapidly and is as rapidly cooled, the sea, on the contrary, absorbs heat slowly and gives it out slowly. Moreover, by means of its waves, tides, and currents, the waters of the sea circulate freely and thus tend to establish a uniformity of temperature in its various parts Hence it is that the sea is on an average throughout the

year warmer in the north and south and cooler in the tropics than is the land in the same latitude Moreover, the sea is cooler in summer and warmer in winter than is the land. The difference in the attitude of land and sea towards temperature produces monsoons and land and sea breezes The latter are diurnal and strictly local The land being heated during the day, the air over it rises and thus induces an inward draft of air from the sea At night, the air over the land being cooled, a reverse current is set up The monsoon (q v) is a similar land and sea wind, but on a much greater scale, and is induced by differences of temperature between land and sea in summer and winter There is a monsoon tendency on the margins of all continents, but in most cases it has little influence upon the more general movements of the atmosphere The cooling of the land surface, and consequently of the surface atmosphere, after nightfall induces a local circulation of air in the interior of continents This air, being cooled and consequently heavier, flows down slopes and collects in the valleys Hence in mountainous regions there is a wind at night down the cañons, and the air in the depressions is cooler than on the slopes above Frosts occur in the valleys, while the slopes above may be exempt from them

A fall of rain or snow requires the coexistence of two conditions—an atmosphere partly or wholly saturated with moisture, and the chilling of this atmosphere below the saturation point, which may be brought about by forcing the air currents up to an elevation, to a higher latitude, or by mixture with colder air. The trade winds of the Atlantic bring to the Amazon basin and the eastern slope of the Andes an atmosphere loaded with moisture, which, as the land is during most of the year cooler than the air, is deposited freely, giving this region a profuse rainfall, while the summit and western slope of the Andes within the tropics are mainly desert The southwest monsoons of India and southern China bring vast stores of moisture from the Indian Ocean, which are deposited freely upon the colder land The west coast of the United States and Canada, under the influence of the prevailing westerlies from the Pacific, receives in winter, when the land is cold, a profuse rainfall, while in summer, when the land is warmer, these moist air currents carry much of this moisture over into the Rocky Mountain region Hence in Colorado, Arizona, and New Mexico the summer is the rainy season The same westerly winds supply moisture from the Atlantic to western Europe, and here since there are no great mountain ranges to intercept it all at once, the rainfall is more generally distributed than in North America, being greatest on the coast and diminishing gradually eastward, so that it is only in the far interior of Asia that desert conditions prevail The southern part of South America lies within the region of the prevailing westerly winds, and here the western slopes of the Andes have an ample rainfall, while over the pampas of Argentina these winds, drained of most of their moisture in the passage over the Andes, blow as dry winds See METEOROLOGY

BIOGEOGRAPHY

Phytogeography and Zoogeography. The distribution of plants and animals is determined by a number of factors, which are more or less interdependent The chief of these are the physical characteristics, the climate, topography, etc , of the region, with which should be coupled the characteristics of plant and animal life Closely related to these are the changes in climate, topography, etc , and the adaptability of various species Other factors are the means of dispersal of forms of life, and the results of the competitive struggle for existence among them Under the last should be included the results of man's interference with the adjustment of life conditions which prevailed upon his advent

The play of the above agencies has resulted in a somewhat complex distribution, some of whose features are not yet easy to explain In some cases widely separated regions have fauna and flora remarkably similar, like the British Isles and those of northern Japan The physical conditions are quite similar, but the areas are separated by almost the semicircumference of the globe On the other hand, adjacent regions, with similar physical conditions, often differ widely in fauna and flora, as in the case of Australia and New Zealand Regions with very different fauna and flora are in some cases connected by transition zones, through which the change is made gradually, while in other cases the change is a sudden and violent one Certain well-marked types occur in scattered localities in various parts of the earth without apparent connection one with another

Although much study has been devoted to the subject, no satisfactory classification of the earth's surface with respect to its life has yet been evolved.

In polar regions, such as the northern parts of North America, Europe, and Asia, the soil is permanently frozen below, thawing only at the surface in summer, thus forming the well-known tundra, whose chief vegetation is reindeer moss, among which bloom in summer many bright-colored flowers This tundra passes in less cold regions into moors and heaths

Desert regions are characterized by a scanty growth of yucca and many species of thorny shrubs, where desert conditions are less intense, various species of Artemisia abound The great plains of North America, the pampas of Argentina, and the Siberian steppes, which may be characterized as subhumid regions, are clothed with grasses, and these pass by insensible degrees through prairie regions of mingled grasses and woods to forested regions These differ widely in character in different parts of the earth In the colder regions coniferous forests prevail, in the more temperate regions coniferæ and broad-leaved trees are mingled, while the forests of tropical regions are commonly of the latter class, with dense undergrowth The greatest and densest forests are, as a rule, found in regions of heaviest rainfall Thus, the broader distinctions in the character of the vegetation are in great part controlled by temperature and rainfall See DISTRIBUTION OF PLANTS

The faunas of the earth are less dependent upon climate than the floras, since animals can migrate somewhat freely and have in greater or less degree the ability to protect themselves from its adverse elements Still, each climatic zone has a fauna of its own, differing markedly from neighboring ones—the polar from the temperate, and the temperate from the tropic zone The musk ox, polar bear, and Arctic foxes, blue and white, are confined to regions of ice and

snow In temperate regions their nearest relatives are the bison, the black and grizzly bears, and the red fox, who range with the wapiti, antelope, and many species of deer The tropic fauna is probably less closely related to that of temperate regions It is characterized by large mammals, the elephant, rhinoceros, hippopotamus, camel, lion, tiger, leopard, many species of marsupials (in Australia), monkeys, etc The fauna of the desert differs widely from that of well-watered regions in amount, variety, and species, which is due, in great part, of course, to the difference in plant food supply In the same latitudes and similar climates there are both close agreements and wide differences Thus, the faunas of Europe and North America do not differ materially, but between Australia, Africa, and South America there are wide, even radical differences Australia, with its marsupial fauna, resembles no other region on earth, and at few points are there resemblances between Africa and South America The great carnivora of the former continent have few representatives in South America See DISTRIBUTION OF ANIMALS.

Anthropogeography Of all forms of life, man is the most cosmopolitan. He is found from the frozen region to the equator. His ability to protect himself from hostile climatic conditions enables him to survive even under those most adverse, but certain conditions seem to be the most favorable to his development Arctic conditions, where besides a hostile climate the economic struggle is severe, are not conducive to his development On the other hand, the languid climate of the tropics, with the ease of living, seems equally unfitted for the development of civilization It is in temperate climates, which stimulate exertion, and where effort meets with adequate reward, that man has reached the highest level.

The races of mankind are commonly classified according to color and other characteristics as fair-complexioned or Caucasian, yellow or Asiatic, brown or East Indian, red or American Indian, and black or negro. The Caucasians (including all the Indo-European peoples, the Semites and the Hamites, the last-named being dark-skinned) inhabit Europe, a large part of Asia (mainly in the south and southwest), northern Africa, North America, South America (in parts of which they are outnumbered by the red race), and Australia, and are scattered, in greater or less numbers, over other parts of the earth The yellow race comprises the Chinese, Japanese, Koreans, Tibetans, and various peoples of Central and southeastern Asia. The brown peoples are those of the Malay Peninsula, the East India Islands, and Polynesia. The American Indians inhabited the entire continent from Bering Strait to Cape Horn, but in Central and South America they have become much mixed in blood with their Spanish conquerors The black race, whose home is Africa, have been subjected to forced migrations, under slavery, and many millions of them are now found in the United States, the West India Islands, and Brazil See MAN, SCIENCE OF

The migrations of man over the earth's surface, his present location, and the stage of civilization which he has reached, are, in the last analysis, the results of geographical environment, whatever the immediate cause may be. Great Britain has become, because of her insular position and her limited farming area, a great commercial nation. New England, by reason of the destructive competition of Western farms, has changed her industries from agriculture to manufactures Thus, the climate, soil, and surface determine in great measure the products and leading industries of a region, subject, of course, to the degree of civilization of the inhabitants

The leading industries of mankind—pastoral pursuits, mining, fishing, agriculture, manufactures, and commerce—require different forms of distribution of the inhabitants Pastoral pursuits imply a very sparse population scantily distributed, since cattle and sheep require large areas for their sustenance In agriculture a much smaller area to a family suffices, implying a much denser population, while manufacturing and commerce require that people be closely grouped in towns and cities Hence, in the history of the settlement of a region, we may often trace a direct connection between the principal vocations of the people and the average density of population In early stages of settlement, when the people are few in number and widely separated, pastoral pursuits are the principal ones. As population increases, the herders are crowded out by the farmers, and still later cities spring up and grow, and manufactures and commerce become the dominant industries

Cities have been located from a great variety of considerations Anciently a common cause of their location was protection from enemies, and hence they were placed in easily defensible positions. As wars have become less frequent, and as private property has become more exempt from danger, they have been placed in industrially strategical positions—commercial cities on harbors, manufacturing cities at sites of water power, etc. Often, however, through changes in industrial methods, such locations cease to be advantageous, yet through sheer inertia the cities remain and grow

The form of landholdings is significant of the degree of civilization, and often, on the other hand, may hasten or retard its progress Among savage and barbarous peoples, and even those possessing some degree of civilization, such as the Russian peasantry, land is held in common by communities Among most highly civilized peoples individual ownership is well-nigh universal, and such a form of ownership undoubtedly conduces to a high development of the race, as it carries with it a sense of proprietorship and responsibility.

The people of the earth are organized into communities, various in form, size, and character, for governmental purposes Savages are grouped in clans and tribes, civilized man into empires, kingdoms and republics With primitive man the functions of government are few and are mainly confined to war, offensive and defensive, and the organization is feeble and often short-lived With advance in civilization come an increase in the strength of the government and an extension of its functions From being only an offensive and defensive league, the government of a civilized nation defends the rights of its citizens against one another, protects them in person and property, in many cases educates them, and maintains public utilities, such as surveys, means of communication, water supply, lighting, etc

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HISTORY OF GEOGRAPHY

The history of geography falls naturally into two divisions, the first of which records the development of ideas regarding the shape and size of the earth, while the second deals with the gradual increase of definite information about the actual facts of land and water distribution The conception of the earth as a flat surface, probably encircled by water, is common to all primitive peoples This idea, which is still held by many savage tribes, was gradually discarded as the mathematical sciences and philosophical speculation in general developed, and the Greeks finally succeeded in proving that the world is a globe Aristotle is ordinarily credited with this discovery, though the Pythagoreans taught the doctrine of the rotundity of the earth long before his time Aristotle estimated the circumference of the globe at about 40,000 miles

The earliest map representing the known portion of the earth is that of the Greek Anaximander, who lived 610 to 546 B.C. Hecatæus, also a Greek, who lived between 550 and 475 B C, and who had traveled extensively in Egypt, Persia, Libya, Spain, and Italy, wrote a book describing these countries and made a map improving and extending that of Anaximander. Thales, a Greek of Miletus, who flourished about 600 B C, divided the earth into five climatic zones, much as they are recognized to-day, and introduced the equator and meridians He discovered that the plane of the ecliptic is inclined to that of the equator and made a rough measurement of the inclination.

The real founder of scientific geography was Eratosthenes, librarian of Alexandria (c 276–195 B C). He made accurate measurements of the length of the sun's shadow at Alexandria and at the First Cataract of the Nile, assuming that they were on the same meridian, and thus calculated the earth's circumference as about 25,000 miles, which is surprisingly near the actual figure

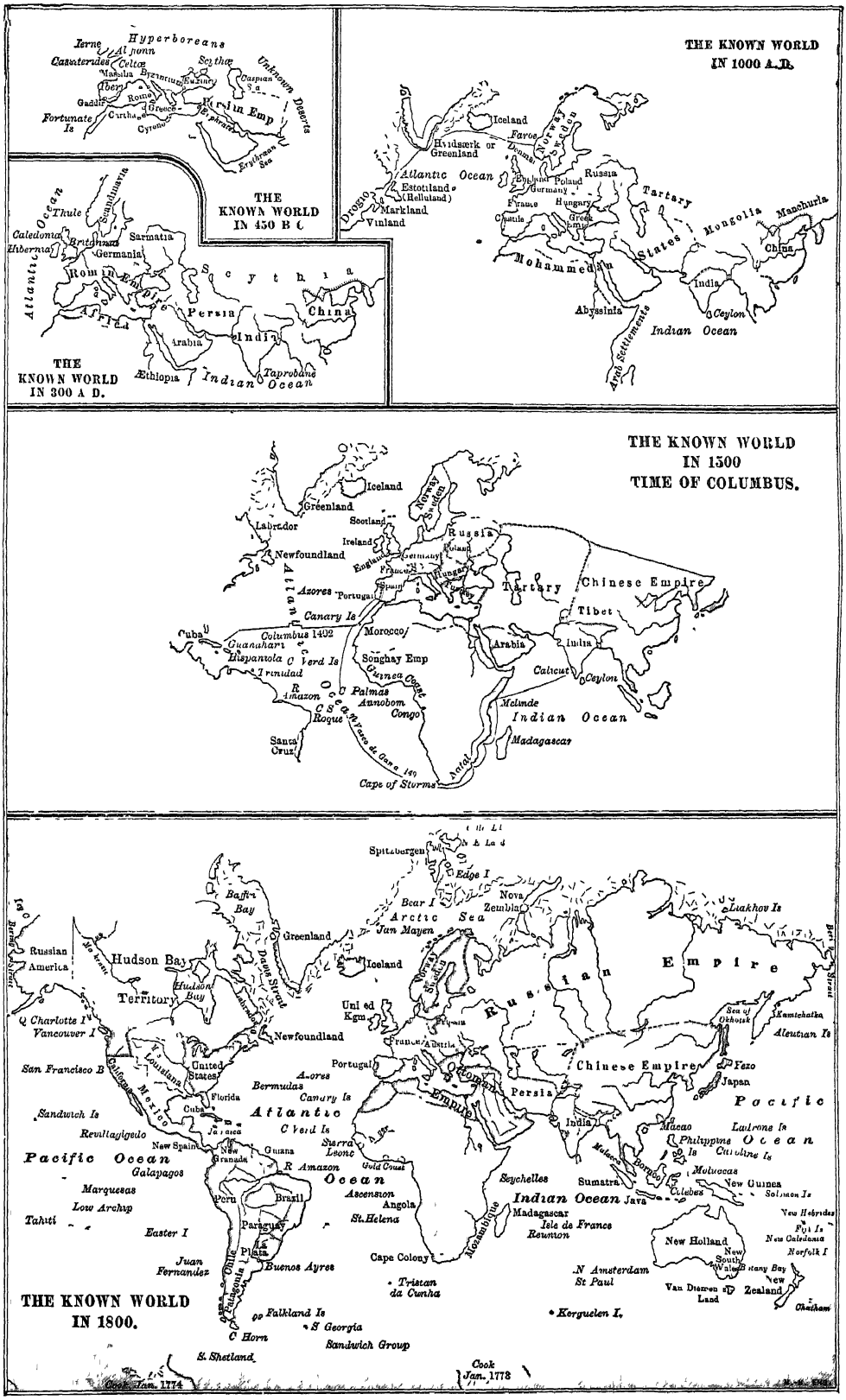
Strabo, who was born about 60 B C., was the first to attempt a work on general geography. His treatise consists of 17 volumes, two of which are devoted to the world at large as an introduction, 10 volumes to Europe, four to Asia, and the remaining one to Africa

The great work of Ptolemy the Alexandrian,

who lived in the second century of our era, marked an epoch in early geographical science and was for many centuries the paramount authority on the subject of the earth, and his map was that universally used Still, the map contained several serious errors, which had far-reaching results. He fell into the error of adopting the result given by Posidonius for the earth's circumference, and this, together with an error in the longitude of the Canaries, which marked his initial meridian, resulted in bringing the west coast of Europe and Africa within 9000 miles of the east coast of Asia. It was this which induced Columbus, 13½ centuries later, to voyage westward to reach the Indies The map is constructed on a reticule of parallels and meridians, and though its errors of position and form in detail are many, it shows in comparison with earlier maps, especially that of Hecatæus, a vast extension of the known world The advances in knowledge thus made were largely lost during the Middle Ages, when the scholastics developed the older plane-surface theory of a world, with Jerusalem as the centre of the universe The most elaborate treatise embodying these ideas is that of Cosmas Indicopleustes, who lived in the sixth century (a translation has been published by the Hakluyt Society, London, 1899) Many specimens of mediæval cartographs, embodying these ideas, have survived, the most important of which have been reproduced by Prof Konrad Miller, of Stuttgart The modern development of ideas concerning the form and magnitude of the earth is treated in the articles on ASTRONOMY and NAVIGATION

Exploration, Ancient. The legend of the Argonauts undoubtedly grew up around the story of actual voyages made by the early Greeks to the Far East The Phœnicians were the first nation of discoverers, and, like most of their successors, they were animated by the desire of gain. Tyre and Sidon became great commercial centres, from which ships sailed to all the Mediterranean waters, and to which traders came from India and from the lands beyond the Red Sea a thousand years before the Christian era By the time of Herodotus (c 484–424 B C) Phœnician voyagers had passed through the Strait of Gibraltar, the ancient Pillars of Hercules, establishing settlements along the northwestern African coast, or coasting across the Bay of Biscay to the tin mines of Cornwall The Phœnicians made valuable contributions to the exact knowledge of geography in their *periplı*, or itineraries The names of two famous sea captains are associated with the furthermost extension of Phœnician exploration—that of Hanno (about 450 B.C), who led a party of several thousand colonists down the African coast to the neighborhood of Sierra Leone, and that of Himilco (about 500 B C), who sailed beyond Cornwall to Ierne or Ireland Another famous voyage was made somewhat previous to this time by an Egyptian fleet dispatched by the Pharaoh Necho, which started from the Red Sea and, as it is reported, returned through the Strait of Gibraltar after a voyage around Africa lasting several years. About 320 B C Pytheas, a Carthaginian navigator, set out from Marseilles and sailed past the coast of Spain and Gaul as far as "Ultima Thule," probably the Shetland Islands The conquests of Alexander the Great added little to the limits of exploration, but proved of inestimable service in bringing Europe and Asia together and giving the West some knowledge of the countries and characteristics of the East Rome continued the work of increasing and unifying the geographical knowledge of the world and brought Britain, Germany, and many other border regions within the circle of civilized nations Much of this knowledge was wiped out in Europe by the irruptions of the Germanic and Tatar tribes, but much too, was fortunately saved by the Arabians, who rose to power after 630 Science and learning, driven out of Europe, flourished at Bagdad, Damascus, and Cordova, and other capitals of Islam After 800 the study of the Ptolemaic cosmography was assiduously carried on, and important geographical treatises were composed by Abu Jaafra Mohammed, who wrote between 813 and 833, Al Masudi, who between 943 and 94 traveled extensively in southern Europe and Asia, going as far as China, and Idrisi, whose comprehensive *Geographer's Garden of Delight* appeared in 1154 The greatest of the Mohammedan travelers was Ibn Batuta (c 1304–78), a Moor of Tangiers in Morocco, who traversed northern Africa, Asia Minor, India, China, and the steppes of southern Russia and Central Asia, covering nearly 75,000 miles When the Renaissance came in Europe, much of the older geographical learning was recovered from Arabic books and scholars During the mediæval period the journeys of Benjamin of Tudela (1160–73), Friar John of Piano Carpini in 1245, William of Ruysboeck in 1255, and the Franciscan Friar Odoric (1316–30), served to keep Europe in touch with what was happening in Asia Much more important were the travels of Marco Polo, of Venice, because the spirited account of his adventures and observations, written after his return in 1295, acted greatly towards the revival of active exploration

Exploration, Modern. This revival is associated with the name of Prince Henry of Portugal, known as "the Navigator" Prince Henry devoted all his time and resources, from 1418 until his death, in 1460, to fostering maritime exploration, with the results detailed in the article on AFRICA, under *History* Of the Mediterranean nations, Italy especially furnished a remarkable succession of navigators, who, sailing under other flags, doubled the extent of the known world during the century following the death of Prince Henry Columbus in 1492 proved the possibility of crossing the Atlantic and discovered the New World, which he took to be the Indies; John Cabot in 1497 landed on the coast of North America, Vespucci between 1497 and 1501 established the continental character of the southwestern Atlantic shores, and Verrazano gave France her claim to the northern continent in 1524 Before the advent of these Italians Bartholomeu Dias in 1488 rounded the southern point of Africa In 1497–98 Vasco da Gama made the sea voyage to the real Indies by way of the Cape of Good Hope For the next hundred years discoveries followed close upon each other, until all the main features of sea and land upon the globe had been determined Serrão reached the Moluccas or Spice Islands by way of India in 1512, and in 1520–21 Magellan found the way to them across the Pacific Magellan perished in the Philippines, but his ship, the *Victoria*, kept on her voyage westward to Spain, completing the first circumnavigation of the globe Cartier in 1543 entered the St Lawrence and with the


THE KNOWN WORLD IN 1000 A.D.
THE KNOWN WORLD IN 450 B.C.
THE KNOWN WORLD IN 300 A.D.
THE KNOWN WORLD IN 1500 TIME OF COLUMBUS.
THE KNOWN WORLD IN 1800.
Hyperboreans
Ierne
Cassiterides
Celtæ
Scythæ
Unknown Deserts
Persian Emp
Fortunate Is
Thule
Caledonia
Hibernia
Britannia
Germania
Sarmatia
Scythia
Roman Empire
Africa
Persia
China
India
Arabia
Æthiopia
Taprobane
Indian Ocean
Atlantic Ocean
Iceland
Faroe
Norway
Sweden
Hvidsærk or Greenland
Atlantic Ocean
Estotiland (Helluland)
Markland
Vinland
Drogio
Russia
Poland
Germany
France
Hungary
Castile
Greek Emp
Tartary
Mongolia
Manchuria
Mohammedan States
China
India
Ceylon
Abyssinia
Indian Ocean
Arab Settlements
Iceland
Greenland
Labrador
Newfoundland
Scotland
Ireland
England
Russia
Poland
Germany
France
Hungary
Spain
Portugal
Azores
Canary Is
Tartary
Chinese Empire
Tibet
Cuba
Columbus 1492
Guanahani
Hispaniola
C Verd Is
Trinidad
Morocco
Songhay Emp
Guinea Coast
Arabia
India
Calicut
Ceylon
Palmas
Annobom
Congo
Melinde
Indian Ocean
Madagascar
Santa Cruz
Cape of Storms
Spitzbergen
Edge I
Bear I
Arctic Sea
Jan Mayen
Nova Zembla
Liakhov Is
Baffin Bay
Greenland
Iceland
Russian America
Hudson Bay
Hudson Bay Territory
Davis Strait
Labrador
Newfoundland
Russian Empire
Q Charlotte I
Vancouver I
United States
Louisiana
California
Mexico
San Francisco B
Florida
Cuba
Jamaica
Sandwich Is
Revillagigedo
New Spain
New Granada
Guiana
Pacific Ocean
Galapagos
Marquesas
Low Archip
Tahiti
Easter I
Juan Fernandez
Peru
Brazil
Paraguay
La Plata
Chile
Patagonia
Buenos Ayres
Falkland Is
S Georgia
C Horn
Sandwich Group
S. Shetland
Cook Jan. 1774
Cook Jan. 1778
Atlantic Ocean
Azores
Bermudas
Canary Is
C Verd Is
Sierra Leone
Gold Coast
R Amazon
Ascension
Angola
St. Helena
Cape Colony
Tristan da Cunha
Mozambique
Seychelles
Madagascar
Isle de France
Reunion
Indian Ocean
Sumatra
Java
Celebes
Borneo
Molucca
Philippine Is
Macao
Ladrone Is
Caroline Is
Moluccas
New Guinea
Solomon Is
New Hebrides
Fiji Is
New Caledonia
Norfolk I
New Holland
New South Wales
Botany Bay
New Zealand
Van Diemen's Land
Chatham
Kerguelen I.
N Amsterdam
St Paul
Russian Empire
Sea of Okhotsk
Kamtchatka
Aleutian Is
Chinese Empire
Yezo
Japan
Pacific Ocean
Persia
Ottoman Empire
Portugal
France
Austria
Prussia
United Kgm
Norway
Sweden
Iceland
Greenland
Davis Strait
Hudson Bay
Territory
Russian America
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Vancouver I
San Francisco B
Sandwich Is
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Cape Colony
Tristan da Cunha
Kerguelen I.
Cook Jan. 1778

exploration of that river basin began the work which was continued by Champlain, Joliet, and the Jesuit fathers in the seventeenth century and completed by La Salle, who reached the mouth of the Mississippi in 1682, thus establishing the general character of the interior of North America In 1542 Antonio de Mota reached Japan, and in the same year Gaetano discovered the Sandwich, or Hawaiian, Islands In 1553 and 1556 Sir Hugh Willoughby, Richard Chancellor, and Stephen Burrough sailed around northern Scandinavia to Archangel, sighting Nova Zembla Chancellor and Jenkinson proceeded to Moscow, and thence the latter went on to Bokhara, bringing back to Europe much information about the interior of Russia Frobisher began the long record of English explorations in the Northwest in 1576, and the next year Drake started on the second circumnavigation of the globe Australia was discovered by Torres and the Dutch sailors of the *Duyfken* in 1606, although it is possible that it had been seen a few years before by the Portuguese In 1642 Tasman completed the delineation of the main outlines of this continent and established the character of the lands beyond it to the south and east For a century and a half the tide of discovery slackened while the nations of Europe were busy with the task of occupying and exploiting the vast areas newly brought to their knowledge Then came the work of Bering, who in 1728 established the boundary between Asia and America at the strait which had been reached in 1648 by Deshnev (and which received the name of Bering Strait), and that of Captain Cook, who between 1768 and 1779 completed the survey of the water world, proving that there was no large habitable land mass undiscovered in the Southern Hemisphere The work of Cook was perfected by La Pérouse, who finished the delimitation of the oceans in 1788

Meanwhile the scientific exploration of the interior of the continents had begun In 1740 Varonne de la Vérandrye reached the Rocky Mountains of North America, and in 1771 Hearne penetrated to the Arctic shores of the same continent by way of the Coppermine River In 1768–72 Bruce began the century-long task of opening up the interior of Africa by his journey to the headwaters of the Blue Nile. In 1789 Mackenzie discovered the great river to which his name is given Lewis and Clark (1803–06) and Pike (1805–07) filled in many of the important features of the western United States From 1799 to 1804 Humboldt traveled in the West Indies, Mexico, and South America, and by the accurate and comprehensive reports of his observations set a new standard which has increased immensely the value and trustworthiness of most of the geographical work done since his time. Mungo Park had reached the Niger in 1796 Through his explorations and those of Clapperton, Denham, and Lander, the problem of the source of the Niger was solved by 1830 In the course of their journeys Clapperton and Denham reached Lake Chad in 1823 In 1828 René Caillié visited Timbuktu, where Laing had been killed in 1826 Livingstone crossed South Africa, tracing the course of the Zambezi, between 1849 and 1856, and in 1859 he discovered Lake Nyassa While Livingstone was traveling in the region of the Zambezi, the German traveler Barth was engaged in a remarkable series of explorations in the western Sudan Burton and Speke found the way to Tanganyika and Victoria Nyanza in 1858, and within the next six years Grant, Speke, and Baker approximately solved the problem of the real sources of the Nile Lake Albert Nyanza was reached by Baker in 1864 Stanley in 1876–77 traced the course of the Congo, the principal affluents of which were observed by Wissmann during his two journeys across Africa between 1881 and 1887 In 1887 Stanley set out on the Emin Pasha relief expedition, in the course of which he discovered the Mountains of the Moon of Ptolemy Asia, largely because it has been in parts longest known, remained for a time least known to Europeans Between 1785 and 1794 Billings surveyed eastern Siberia Somewhat earlier, in 1761–67, Niebuhr had explored parts of Arabia, a work which was supplemented by Palgrave in 1862–63 In 1856–57 the brothers Schlagintweit crossed the Himalayas and Tibet In 1868 Richthofen entered upon his career as a Chinese explorer, and about the same time Ney Elias traversed central China The arid wastes of Central Asia included within the boundaries of China were visited four times between 1871 and 1888 by Przhevalsky Valikhanoff reached Yarkand in 1859, and in 1870 Fedtchenko penetrated into the country north of Pamir The course of the Yang-tse, Mekong, and Brahmaputra rivers was traced by the Pundit Krishna between 1878 and 1882 Younghusband traveled from Peking to Kashmir in 1887 Among other recent explorers of Central Asia have been Sosnovski, Potanin, Pyevtsov, and other distinguished Russian travelers, Bell, Carey, Rockhill, Bonvalot, Henry of Orléans, Littledale, and Sven Hedin, who spent the years from 1893 to 1900 in exploring Chinese Turkestan, Tibet, and Mongolia

Among the great Arctic explorers of the first half of the nineteenth century were Parry, the two Rosses, and Sir John Franklin See POLAR RESEARCH

Final proof of the fact that the oceans encircle the continents was supplied by McClure's achievement of the northwest passage (1850–54) and by Nordenskjold's voyage from Norway along the Siberian coast and out through Bering Strait in 1878–79 In 1892 Peary established the insular character of Greenland Nansen's voyage in the *Fram* (1893–96) determined the problem of the Arctic ice motion and proved that there can be no large land division at the North Pole Borchgrevinck visited the Antarctic regions in 1894–95, and again in 1898–1900, and the later Belgian, British, German, Swedish, and French expeditions widely extended knowledge of the South Polar regions

The first geographical atlas was prepared by Claudius Ptolemy at Alexandria about 150 A.D. This gave the location of places on the earth's surface and continued to be the best compendium for 1400 years It was printed many times during the fifteenth and sixteenth centuries, usually with the addition of maps embodying the results of contemporary travel and observation It was finally superseded by the Atlas of Ortelius, published in 1570, and this in turn gave place in 1595 to that of Mercator, who had devised, about 1539, the principle of the projection known by his name Ramusio and Hakluyt, contemporaries of Mercator, published the first two great collections of travels in the less-known parts of the world, thereby providing the data for succeeding efforts to enlarge geographical knowl-

edge Atlases making notable contributions to general knowledge were published by Blaeu in 1638, Sanson in 1645, Delisle in 1700, D'Anville in 1745–71, and Stieler in 1817.

Systematic Geography. The modern science of geography, as defined at the beginning of this article, may be said to have its origin in the work of Alexander von Humboldt and Karl Ritter Although approaching the subject from different angles, each demonstrated its unity and showed that interaction between the physical and the organic world was its underlying principle A generation elapsed before geography received university recognition in Germany, but now every university in that country, where the subject is more advanced than elsewhere, has its chair of geography The foremost exponent during this period was Baron von Richthofen Within the last 15 or 20 years the science has also made great progress in France, thanks to Vidal de la Blache, and in Great Britain through the efforts of Mackinder and Herbertson In the United States the European conception of geography is just beginning to make itself felt Although the Ritter school had an able exponent in this country, in the person of Guyot at Princeton University, this influence did not prevail. It was rather the geological side of the subject that received special attention in this country, mainly through the efforts of W. M Davis, whose work in physiography has left a lasting impression on American geography Only recently has interest arisen in other phases of the subject, mainly in human geography, more especially in response to a demand from educational circles for a more teachable presentation of the subject.

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GEOGRAPHY, ECONOMIC Economic geography treats of the production, exchange, and transportation of commodities It discusses the distribution of natural resources, plant, animal, and mineral, and the various industries connected with them. It takes up the various forms of man's economic activities The most important of these are agriculture, mining, manufacturing, and commerce All of these presuppose an advanced stage of civilization, while such activities as gathering, fishing, and hunting, as the sole means of subsistence, represent the lower forms of civilization The most important mineral products are coal and iron; their association is the mainstay of modern industrial development. Manufacturing is mainly carried on with the aid of machinery. The necessary power is derived from several sources—moving water, steam, and electricity Commerce consists essentially of the exchange between different regions of the commodities which each most easily produces It may be divided into two parts, trade and transportation Trade is the arrangement of the exchanges, e g, the buying and selling of goods, while transportation is the conveyance of the goods to their destination That part of economic geography which deals with commerce has often been designated commercial geography, although this term is also used synonymously with what has here been defined as economic geography The study of Commercial or Economic Geography forms an important course in the work of many leading universities For bibliography see the article GEOGRAPHY

GEOGRAPHY, MEDICAL See DISTRIBUTION OF DISEASES

GEOLOGICAL SOCIETY OF AMERICA An organization for the promotion of science and geology in North America, organized in 1888 The society holds one meeting annually, at which many technical papers are presented, and during the following year some of these papers are printed in a volume known as the *Bulletin* The society had a membership in 1914 of about 360, comprising nearly all the working geologists of the United States

GEOLOGICAL SURVEY, UNITED STATES The United States Geological Survey, a bureau of the Department of the Interior, is charged with the investigation of the geological structure and mineral resources of the country The bureau was organized in 1879 as a consolidation of the independent surveys that had been active for several years in exploring the Western States and Territories. In 1867 Clarence King organized a geological expedition for the examination of a belt of country including the fortieth parallel, and extending across the Rocky Mountains from Wyoming to California In the same year the general government commissioned F V. Hayden, who had previously been attached as scientist to exploring parties in the West, to make a survey of Nebraska The exploration of territory west of the one hundredth meridian and of the Colorado basin was provided for by the government in 1871, and the expeditions were placed under the direction of George W Wheeler and J W. Powell The four organizations, popularly known as the King, Hayden, Wheeler, and Powell surveys, fulfilled an important mission in the scientific investigation of a vast and little-known territory. As the scope of operations was extended, however, it became evident that the work could be conducted to better advantage under a uniform system A plan for unifying the service was proposed by the National Academy of Sciences and finally adopted by Congress in 1879, when the independent surveys were discontinued. The control of the new organization, known as the Geological Survey, was placed in the hands of a director, who was required to submit an annual report of plans and operations of the Survey to the Secretary of the Interior.

The functions of the Geological Survey, as originally outlined by law of Congress, with subsequent modifications, include the preparation of a topographic map of the United States, the investigation and mapping of the areal geology, the examination of mineral deposits, the collection of mineral statistics, the study of hydrography with reference to water power and the irrigation of arid regions, and the classification of public lands The preparation of the topographic map, a necessary preliminary to the

geologic and hydrographic work, is carried on by the topographic branch of the Survey At the end of the fiscal year 1913 a total area of 1,178,974 square miles, or 38 9 per cent of the entire area, exclusive of Alaska, had been surveyed upon scales of 1, 2, and 4 miles to the inch, varying with the importance of the different regions When completed, the topographic map will give an accurate presentation of the surface features of the country The geologic branch of the Survey investigates and maps the geological formations The map, as rapidly as completed, is issued in folios, it shows the areal distribution of the various rocks, their geological structure, and the location of mineral resources The work of the geologic branch is conducted by four divisions, as follows geology, Alaskan mineral resources, mineral resources, and chemical and physical researches The Geological Survey has contributed much to the advancement of geological science as well as furthered the material interests of the country The publications issued for general distribution include the director's report (annual), monographs, professional papers, bulletins, and water-supply papers. Consult Walcott, *The United States Geological Survey* (Washington, 1895). See MINES, BUREAU OF

GEOL'OGY (from Gk. γῆ, *gē*, earth + -λογία, *-logia*, account, from λέγειν, *legein*, to say). Geology is the science which investigates the history of the earth The rocks of the earth's crust contain the records of this history Many of the pages of the rock book are lost, others are obscured through partial destruction, and many, like the hieroglyphics on ancient monuments, require great care, patience, and intelligence to decipher, yet, in spite of these difficulties, we are already in possession of a vast fund of information concerning the history of the earth

Geological study shows that forces similar to those of the present have been operating in the past Therefore the proper interpretation of the past history presupposes a knowledge of the forces working at the present time to modify the earth. One class of forces, depending largely upon energy from within the earth, causes the earth's surface to rise and fall, volcanoes to erupt, and the rocks to be disturbed, another, deriving its energy from without the earth, mainly from the sun, sets in operation winds, waves, rain, rivers, glaciers, and tides, which wear away the surface of the land and distribute the waste in the oceans The effect of life on the globe is another geological factor Many geological changes are influenced by animals and plants It is of importance, therefore, that in many instances the layers of rock forming the crust contain remains of animals and plants of past ages. The study of these remains has given much information concerning past life and the conditions amid which the life existed. Moreover, since life has developed in orderly succession, the study of the fossils of animals and plants has given a basis for the division of the earth's history into periods, or ages

Although geology stands as a distinct science, with numerous subdivisions, to master it thoroughly requires a broad knowledge of several allied sciences. Botany and zoology are indispensable to the student of fossils, physics and chemistry, to the student of rocks, and astronomy and geography, to all who would broadly grasp the subject of geological history Each of these sciences furnishes tools with which the geologist works out the varied and complex earth history

Fundamental Principles of Geology. Geological work is so slow, and the evidence of vast changes in the past so clear, that, so long as it was held that the age of the earth was to be reckoned in a period of a few thousand years, no other conclusion was possible than that the changes observed had been rapidly made as a result of stupendous catastrophes Thus, the early literature of geology deals largely with imagined deluges, sudden upliftings of the crust to form mountains, destructive invasions of the land by ocean water, and similar catastrophes When, however, it was made clear by Hutton and his successors that the recorded facts indicated slow changes, it began to appear possible that the age of the earth was great The promulgation of the doctrine of evolution, and the increased knowledge of past life, as recorded by the fossils, brought further evidence of the great age of the earth In consequence of these advances in science the interpretation of the former history of the earth by modern geology rests upon two principles that may be considered established one, that *the age of the earth is very great*, the other, that *in the processes in operation at present, we may look for illustrations of most of the changes of the past* These two principles were formulated in the doctrine of uniformitarianism (q v), which was proposed as a substitute for the older theory of catastrophism (q v) By this doctrine the past may be investigated in the light of the present Given time enough, even the slow processes operating at present, which produce no perceptible change in one's surroundings in a lifetime, will accomplish the stupendous results so clearly proved by geological study

Age of the Earth. The evidence from geology all points towards an age for the earth to be reckoned in millions of years One line of evidence upon which this conclusion is based may be illustrated as follows there are, in some places, great accumulations of rock layers which were deposited in the ocean These layers are known to reach a depth of many thousands of feet, in some instances over 40,000 feet A study of these beds indicates that they were accumulated slowly, as similar beds of limestone, clay, sand, and gravel are now being accumulated in the sea If anything like the present rate prevailed, the time required for their formation is very great, probably not less than 100,000,000 years This estimate is, of course, open to doubt because of the question whether the past and the present have been so closely alike, but even if this doubt is warranted, the deduction must still be made that the age of the earth is very great From a study of the wearing away of the land and the planing down of mountains, a similar conclusion may be reached A second class of evidence pointing to a great age for the earth is supplied from a study of the fossils preserved in the rocks The evolution of plant and animal life seems, in general, to have been gradual, as it is in the present time, and this conclusion harmonizes with the evidence from the rocks themselves

Physicists have also estimated the age of the earth in several ways One of these estimates is based on the rate of cooling of the heated interior of the earth Another estimate is based on the effect of the tides in retarding the rotation of the earth by the friction of the tide

wave Still a third line of argument is based upon the rate of cooling of the sun, whose light, according to Lord Kelvin, will not last more than 5,000,000 or 6,000,000 years longer The facts concerning the earth's heat, the sun's heat, and the earth's form, together with the rate of cooling of the sun and the earth and the effect of tidal friction, have led Lord Kelvin and other physicists to the conclusion that the age of the earth is not greater than 20,000,000 years Great though this estimate of time is, it is not great enough to satisfy geologists, for the evidence from geology seems to point to a far longer history for the earth Moreover, physicists are now generally inclined to concede a much greater age than Kelvin estimated, the discovery of new factors, e g, radioactivity, that enter into the calculations has necessitated a more liberal interpretation of the data

From what has been said, it is evident that we are not in a position to state even approximately the age of the earth in years, but all lines of evidence agree in pointing to the conclusion that geological time is to be reckoned in millions of years, and geologists are practically unanimous in the belief that the time since the oldest stratified rocks were deposited cannot be much less than 100,000,000 years

The Branches of Geology. Investigation of the earth's history may be carried on along various lines, in fact, geology is so complex a subject that it is now no longer possible for one man to claim to have a thorough knowledge of the entire subject Consequently it has come to be the custom to subdivide geology into several branches Some of these branches are quite universally recognized, in the case of others there is difference in usage.

1 *Cosmical Geology*—In this branch are included investigations in the borderland between astronomy and geology. It is a consideration of the relations of the earth to the other members of the solar system and to other bodies in space. As archæology is related to history, so is this phase of cosmical study related to geology proper.

2 *Geognosy*—This division of geology includes a study of the materials of which the earth is formed—air, water, minerals, and rocks of the crust—and of the condition of the earth's interior The study of minerals to determine their composition, crystal form, and other characteristics is the province of the science of mineralogy, which has chemical and physical, as well as geological, relationships The study of rocks forms the science of petrology or lithology Petrography, a branch of geology recently developed, is concerned with a study of rocks from the standpoint of their composition, characteristics, and geological relations

3 *Dynamic Geology*—Under this heading is included a study of the operation and effects of the forces that are and have been at work to modify the earth.

4. *Structural Geology*—This division of geology is concerned with a study of the architecture of the earth. That is to say, structural geology investigates the actual arrangement of the materials that are included under geognosy as they have been placed by the forces of dynamic geology Using the parallel of architecture, the crude materials are included under geognosy, the arrangement and position of these materials, and their relation to one another, are included under structural geology, the forces that have formed the materials and arranged them, and the way in which they have operated to do it, form the theme of dynamic geology

5 *Physiographic Geology*—This division deals with the forms assumed by the surface of the land as a result of the operation of the dynamic forces upon the materials and structure of the earth Extending the parallel of architecture to this division, it is to geology what the finished building is to architecture This division of geology is coming to be considered a separate science of physiography, or geomorphology

6 *Stratigraphic Geology*—Historical geology is a term often applied to this division, because it is more intimately connected with a study of past histories than any other of the divisions By a study of the life record inclosed as fossils in the strata, and by a study of the rocks themselves and their structural relations, stratigraphic geology tells of many of the great events in earth history One of the most important phases of this line of study relates exclusively to the investigation of the life record This may be called paleontological geology But now the broader students of stratigraphic geology make use not only of paleontology, but of dynamic, structural, and physiographic geology to determine not merely the life record, but also the physiography of past ages Thus considered, it is one of the broadest divisions of the science

7 *Glacial Geology*—One of the latest events of stratigraphic geology was the general glaciation of different parts of the world The study of the events of this time, which necessarily includes a study of existing glaciers, has attracted a large number of geologists, so that glacial geology has come to be recognized as a distinct branch of the science

8 *Economic Geology*—The geological processes have resulted in the accumulation of many useful materials—soils, clays, building stones, and metallic minerals The study of these from the standpoint of their occurrence and origin constitutes economic geology

COSMICAL GEOLOGY

A full treatment of this phase of geology is out of place in a brief general article Moreover, much of it belongs to astronomy Studies of the shape of the earth, and the resemblances between the earth and other bodies in space, both in form and composition, are undertaken by physicists and astronomers These studies, however, throw light upon the earliest phases of earth history, pointing to the conclusion that the earth, like other bodies in space, was once a molten sphere which has cooled on the outside, forming a solid, cold crust Of the original crust geological investigation has as yet found no sign. It is to the continued cooling of this once molten sphere that we owe some of our most important geological events The forces, having their seat in the heated interior, may be considered as *terrestrial*, or *hypogene, forces* The passage of light and heat to the earth, the great movements of rotation and revolution, and the pull exerted by the sun and moon constitute the *extraterrestrial*, or *epigene, forces*, which, aided by gravity and acting through the medium of air and ocean, set in motion another series of geological agencies Dynamic geology is concerned with a study of the operations of these two sets of forces whose origin is cosmical

Other phenomena of the earth having an influence on geological history are the precession of the equinoxes and the variations in the eccentricity of the earth's orbit These two astronomical changes have influenced the amount and distribution of heat on the earth's surface in past times, but to what extent is an unsolved problem There are still other obscure questions in cosmical geology, e g, the possible changes of the earth's axis and centre of gravity Being on the borderland of two or three sciences and dealing with subjects on which it is difficult to gather facts, these are among the great scientific problems awaiting solution

GEOGNOSY

The earth consists of three quite different sections—the solid earth itself, or the lithosphere, a partial water cover, or the hydrosphere, and a gaseous envelope, the atmosphere Each of these has its geological bearings.

The Atmosphere. The atmosphere consists of a mixture of gases, of which the most important are oxygen and nitrogen in the proportion of 21 per cent of oxygen to about 79 per cent of nitrogen, argon, and other similar elements recently discovered The nitrogen is inert, the oxygen very active, not only in its influence on life, but also in its effect on rocks A minute percentage of carbon dioxide, about 0 03 per cent, is of basal importance to plant life A variation in the percentages of these three constituents would produce a very great difference in the effect of the air Water vapor is present in variable quantities in the air, and its condensation causes the rain upon which springs, rivers, and lakes depend There are also minute solids, called dust particles, and very small quantities of a large number of other substances, as salt, nitric acid, ammonia, etc (See ATMOSPHERE) By its influence on life the air is of the highest geological importance. It also affects rocks directly, causing them to oxidize and disintegrate, and the movements of the air, in the form of wind, produce direct geological results, as well as indirect ones by the agency of waves and currents which are wind-driven A consideration of the geological effects of the air forms part of dynamic geology.

The Ocean. Filling the depressions between the continent upfolds are the oceans, reaching a depth in some places of 5 or 6 miles. Altogether, about three-fourths of the earth's surface is covered with ocean water, with an average depth of over 2 miles This great hydrosphere is disturbed by tidal waves, ocean currents, and wind waves, which are important agents of dynamic geology. As a modifier of climate, and as the source of the water vapor in the air, it is also of geological importance In the ocean water many substances are held in solution, the dissolved solids constituting about three and one-half parts to every one hundred parts of water Of these dissolved substances, over three-fourths are common salt and one-tenth is chloride of magnesium A minute proportion of carbonate of lime is the basis for the limy shells and tests which have so often accumulated to form beds of limestone As the home of shell-building animals whose remains form rock beds, and as the seat of deposit of waste from the land, the ocean is of the very highest geological importance. See OCEAN

The Crust of the Earth. The cold, outer portion of the earth is composed of rocks—some derived from beneath the surface, whence they have risen in molten condition, others formed by the reassortment of the materials obtained from the disintegration of other rocks These rocks have been subjected to movements, as a result of which the earth's surface has been made irregular The cause of these movements of the crust depends upon the unstable equilibrium of the earth itself, the results have been to make great downfolds where the ocean basins are situated and upfolds where the continents are located, with numerous minor uplifts and downsinkings along narrow lines, both in the sea and on the land, forming mountain ranges (See CRUST OF THE EARTH) By far the greater part of the earth's surface is fairly level Most of the ocean bottom is a vast series of submarine plains with occasional mountain ranges and volcanic peaks rising above them On the land much more than half the surface is also plain or plateau, some of the plateaus rising to elevations of 10,000 to 15,000 feet See CONTINENT

In the ocean the deposit of waste from the land, and the accumulation of the solid parts of animal remains, have the general tendency to level the sea floor Agents of erosion are in general ineffective excepting at the contact between land and sea, and consequently the only forces operating to make the sea floor irregular are those of uplift or downsinking of the crust On the land, on the other hand, the action of the forces of denudation carves the mountains, plains, and plateaus, making the surface more irregular And along the coast line the work of the waves and tides is added to the dynamic processes by which the land is being irregularly denuded Thus, the land portion of the earth's crust is often deeply scarred and cut, revealing the internal structure of the superficial portions of the crust

Interior of the Lithosphere Early geologists considered the interior of the earth to be molten, basing their conclusion upon a number of facts pointing to a high temperature for the interior The numerous hot springs indicate heated conditions below the surface, all deep borings and mines show a rise in the temperature with increasing depth, and volcanoes actually bring melted rock to the surface The movements of the crust also may be accounted for by assuming a heated interior, which upon cooling and shrinking allows the cold, solid crust to settle on it and wrinkle. If the observed increase in temperature in mines and borings, which averages 1° for every 50 to 60 feet of descent, is continued far into the earth, temperatures must eventually be encountered which are above the melting point of rocks at the surface.

Astronomers and terrestrial physicists have shown, however, that the earth cannot be a molten sphere with a thin crust. In its behavior towards other members of the solar system the earth acts like a solid body, and one as rigid as steel If there is a solid crust, it must be at least 2500 miles thick The evidences for this conclusion are obtained not only from the behavior of the earth towards other members of the solar system, but also from the absence of tides which would be present in a molten interior, and from the fact that the average density of the earth is far greater than that of the rocks at the surface, indicating a very dense, heavy interior.

Geological facts also point towards the conclu-

sion that the earth's interior is not molten Consequently geologists have long accepted the hypothesis of a solid heated interior, so hot that it would be molten under normal conditions, but kept from melting by the enormous load of the crust, since the melting point of rocks is raised with an increase in pressure Whether there is a zone of molten rock between the solid cold crust and the solid heated interior is not known. Many believe that the rock of the interior is molten only where the pressure is relieved by the uparching of the crust under mountain folds. The condition in which the heated rock exists in the interior is one of the fundamental problems of geology still awaiting solution

Elements and Minerals of the Earth's Crust Relatively few of the 80 or more elements form an important percentage of the crust Oxygen, the most abundant element of the outer portion of the earth, constitutes 86 per cent of the ocean, 21 per cent of the air, and 47 per cent of the crust Nitrogen, though forming about three-quarters of the air, is of little importance in the ocean or the rocks Silicon forms 27 per cent of the crust, and aluminium 8 per cent, so that the three elements (oxygen, silicon, and aluminium) together constitute 82 per cent of the crust. Next in importance are the following iron, 5, calcium, 4, sodium, potassium, and magnesium, each about 2 5, carbon, 0 22, hydrogen, 0 21, phosphorus, 0 1, sulphur, 0 03, and chlorine, 0 01 per cent

These elements, combined according to definite chemical laws, form minerals A great variety of different combinations are known, making, in all, over 2000 mineral species Most of these are rare, and only a very few form prominent contributions to the crust Of these common minerals, by far the most abundant is quartz, made of the two common elements silicon and oxygen. Its hardness and indestructibility make it a factor of strength in rocks. Probably next in abundance is the group of feldspars, of which a number of different kinds are recognized Although hard minerals, the feldspars disintegrate in the weather, forming clay and certain soluble substances. Calcite is a third common mineral, composed of calcium, carbon, and oxygen. It is fairly soft and quite soluble in waters carrying carbon dioxide or mineral acids Dolomite, the magnesium carbonate of lime, has similar characteristics to calcite Other common rock-forming minerals are the micas, amphiboles, and pyroxenes, mainly complex silicates of aluminium with potassium, magnesium, iron, etc Gypsum, the hydrous sulphate of lime, and the several oxides of iron—limonite, hematite, magnetite—the carbonate of iron, siderite, and the sulphide of iron, pyrite, are other common minerals Of these or their decayed products the great part of the rocks of the crust are made These minerals are of high geological importance; the others are of interest especially to the mineralogist and the petrographer. See MINERALOGY; QUARTZ, FELDSPAR, ETC

Rocks of the Earth's Crust. Minerals, combined in various ways, form rocks Sometimes the combinations are according to definite chemical laws; but rocks are usually mere aggregates of several minerals A threefold division of the rocks may be made as follows: *igneous*, or those derived from a molten condition; *sedimentary*, mainly sediments in water; and *metamorphic*, or those due to the alteration of other rocks by heat and pressure.

The igneous rocks vary among themselves in two characteristics—one chemical composition, the other texture—and the classification now generally recognized is based upon this double variation From different volcanic vents the lava differs chemically—in the one extreme being very acid, i e, with much silica, in the other being very basic, i e, with a small percentage of silica and a large percentage of the basic elements—iron, magnesium, potassium, sodium, etc These chemical differences give rise to different classes of minerals—quartz and feldspar prevailing in the acid rocks, micas, amphiboles, pyroxenes, and iron oxides in the basic According to the conditions of cooling, the igneous rocks vary in texture Some are blown out by violent explosive expansion of steam and, cooling quickly, form glassy, porous pumice and volcanic ash In other cases flowing lava cools so rapidly that it sets without the formation of individual minerals, forming natural glass, or obsidian More commonly the lava becomes crystalline and is either fine-grained or has a fine ground mass inclosing large porphyritic crystals Many igneous masses do not reach the surface, but cool in the vent of the volcano or, being intruded into the rocks, cool in the crust These cool so slowly that the minerals crystallize into good-sized individuals, producing coarse-grained rocks, like granite, syenite, etc

The term "sedimentary" for the second class of rocks is not perfectly satisfactory, since not all the rocks included are sediments The group comprises mechanical deposits, such as conglomerate, sandstone, and clay, which are derived from preexisting rocks by the processes of disintegration and erosion, and are removed and deposited by air, water, or ice, chemical deposits, accumulated by the precipitation of materials held in solution, and including rock salt, gypsum, calcareous tufa, etc , organic deposits, such as limestone, chalk, marl, coal, and bog-iron ore, which are formed by the growth and decay of animal and plant organisms

Either igneous or sedimentary rocks, under the action of heat and pressure, are subjected to changes which in some cases go so far as to remake the rock entirely This alteration, or metamorphism, sometimes takes the form of crushing, accompanied by the development of new minerals, in other cases there is a development of new minerals without noticeable crushing. This formation of new minerals may go so far as to destroy entirely all evidence of the original characteristics of the rock, as in many schists and gneisses The new minerals naturally develop with their long axes along the lines of least resistance, thus giving to the rocks a parallel structure, and it is due to this feature that slates split readily in one direction, viz, parallel to the cleavage planes of the micaceous minerals By metamorphism, also, limestone is often changed from amorphous carbonate of lime to crystalline calcite, forming marble Sandstone is changed to dense quartzite by the deposit of silica around the grains. Coal is changed to anthracite by the expulsion of volatile substances, causing the concentration of carbon, and in some cases this metamorphism has gone so far as to produce crystalline graphite, which is pure carbon. For details as to origin, composition, and classification of rocks, see the articles on PETROLOGY and ROCK.

DYNAMIC GEOLOGY

Dynamic geology is a conflict between the hypogene and epigene forces The hypogene forces raise some parts of the earth's surface into the air and lower other parts beneath the ocean, the epigene forces attack the parts thus raised and tend to spread over the sea floor the materials derived The epigene forces may be grouped under the general heading of denudation So far the forces of uplift have been more potent than those of denundation, and the land surface is battered and scarred by the conflict, but should the forces of uplift cease, or so lose in effectiveness that denudation was more rapid than uplift, the land would slowly lose in ruggedness, and the surface would be reduced by denudation to a more and more level condition. In discussing the scope and principles of dynamic geology we will first consider the hypogene forces

Changes in the Level of the Land Among the most far-reaching results of geological study is the proof that the earth's surface is not stable at the present time, and that a similar condition has existed in all periods of the past Again and again stratigraphic geology tells of changes in land level of stupendous nature, and studies in dynamic geology have proved that similar changes are now in progress in many parts of the world In some places the movement is an uprising of the land, in others a downsinking, and these movements in some cases affect broad areas of the crust in a slow uprising or downsinking, while in other cases the movement is localized and spasmodic These latter movements are usually associated with mountain growth, earthquakes, or volcanic eruptions, and over a limited area the level of the land may change several inches, or even feet, in a few minutes. The movements affecting large areas are so slow that careful study is necessary to prove their existence

Many instances of land movement now in progress might be given. The coast line of New Jersey is sinking at the rate of about 2 feet a century, the coast of Labrador is rising at an unknown rate, the coast of West Greenland is sinking; in Sweden records of 150 years show that the region south of Stockholm is sinking, while to the north the land is rising, in one place having risen 7 feet in that period Local rapid movements of the land were observed in Japan during the earthquake of 1891, and in California displacements of from 10 to 20 feet were noted after the earthquake of 1906, changes of level, both uprising and downsinking, have occurred in the Bay of Naples, the coast of Chile has been uplifted during earthquakes in the last century Evidence of changes of level in past ages is furnished by elevated beaches, raised beaches that are no longer horizontal, and submerged forests The irregular coast line of parts of continents, as in northeastern America, is interpreted as a drowned coast, where, by land sinking, sea water has been allowed to enter the valleys, forming fiords. In some cases the continuation of the land valleys may be traced along the sea bottom, as in the case of the Hudson River (q.v.).

The question has naturally been raised as to whether these changes are due to land movement or to changes in sea level Some of them, as in Sweden, where the movement is differential, and the spasmodic movements in limited areas, are certainly due to land movement With regard to others, the conclusion is not so certain, though the geological evidence all points towards a change in the land rather than of the sea.

The cause for the instability in the crust has often been referred to the heated condition of the earth's interior Various hypotheses have been proposed to account for the exact manner in which this heated condition causes change in level One hypothesis would explain the change by contraction, by which it is held that, through loss of heat, the interior is shrinking, and the crust, in accommodating itself to the shrinking interior, is caused to move A different explanation, which is supported by some of the leading investigators in dynamic geology, is based upon the principle of isostasy This explains crust movement by assuming that variations in the load on the crust cause movements The reduction of load by denudation of the land and the increase of load in places of sedimentation necessitate an isostatic readjustment, causing sinking in one place and rising in another, as there would be in a pile of wax of irregular height Other hypotheses have also been proposed, but space forbids their discussion here

Mountain Formation The stresses brought about in the earth's crust through the energy which is causing change in level, whether this be due to contraction, isostasy, or other cause, throw the surface into a series of folds, the largest forming the continental uplifts and ocean depressions, the smaller forming mountain chains According to the contractional hypothesis the general movement of the crust is a downsinking, but locally portions are uplifted because the solid crust cannot accommodate itself to the shrinking interior without wrinkling The great pressure thus applied to the rocks, operating through long periods of time, causes them to bend or break Where the rocks which are subjected to these stresses are deeply buried, and hence under great pressure, they bend, even though they are brittle rocks When the strain is more quickly applied, or when the rocks are nearer the surface, faulting is common, and thick beds of brittle rocks, like sandstone or limestone, are more liable to break than thin-bedded rocks such as shales See FAULT

All evidence points to the conclusion that the formation of mountains in the past has been slowly accomplished Indeed, some mountain chains, such as the Andes and those of the East Indies, the Philippines, and Japan, are now growing and apparently little if any more slowly than the mountain growth of the past It is found by a study of the structure of mountains that in most cases their growth has been intermittent; i e, periods of freedom from uplift have occurred Many of the mountain chains are along lines of crust weakness established in the early periods of geological history Along these lines the stresses have relieved themselves at various times so that these regions have remained mountainous throughout geological time. On the other hand, many parts of the crust have been marked by entire freedom from mountain folding The zones of mountain growth extend in a general north and south direction in many parts of the earth, as in western North and South America, eastern North America, and eastern Australia A belt of shorter ranges, with east and west axes, extends across the Old

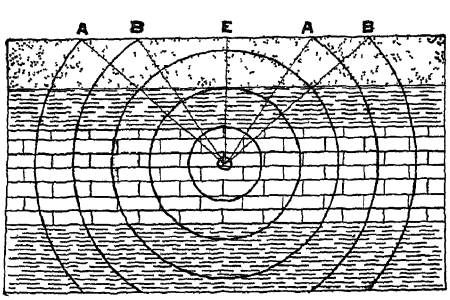
World in the north temperate zone Many efforts have been made to find a system in the arrangement of the mountains of the globe and to account for their distribution, but no thoroughly satisfactory theory has been evolved See CONTINENT, MOUNTAIN, ETC

Volcanic Action Molten lava, rising from within the earth towards the surface, sometimes reaches the surface, but often rises into the crust and remains there Small masses filling cracks in the rocks are called dikes, masses thrust in between the layers of the strata form sills or intruded sheets, like the Palisades of the Hudson, still larger masses, which lift the rock and form great wells of lava, are called laccoliths, or laccolites, and huge masses, with irregular boundaries, common in the cores of mountains, are known as bosses Instances of each of these classes of igneous rock have been revealed by the denudation which has stripped off the overlying strata

Where the molten rock reaches the surface it usually rises through a fissure, and when the volcanic energy is vigorous, as it was during the formation of the mountains of the western United States, the lava may well out through these fissures and form vast floods which inundate great areas on either side of the fissure Hundreds of thousands of square miles in the West are covered by these ancient lava floods In no part of the world is this form of fissure eruption well developed at the present day, though the volcanoes of Iceland approach this type

The geological effects of volcanic eruptions are of very great importance The heat of intruded masses causes change in the rocks with which they come in contact By the outflowing of the lava extensive changes are made in the topography, and highly important, though usually destructive, effects are produced on life. Much rock material is added to the crust, mostly near the volcanoes, in the form of ash and lava flows, but partly as intrusions into the crust and partly as deposits, on the land and in the sea, derived from ash drifted about by the air and water currents. See VOLCANO, LACCOLITE

Earthquakes The eruption of volcanoes is frequently accompanied by a shaking of the earth, and the rising of lava into the crust and the movements of the lava before an eruption also cause earth jars Likewise a breaking of the rocks, or a movement of the strata along a fault plane, causes earthquakes Indeed, any jar



EARTHQUAKE WAVE.

to the rocks, even the explosion of gunpowder or the falling of a cavern, will produce an earthquake shock The jar, originating at a point or along a plane, is transmitted through the rocks as a series of waves moving outward in curved form from the centre, or focus At the epicentrum, directly above the focus, the wave movement is upward, on all sides from the epicentrum it reaches the surface at an angle, departing more and more from the vertical as distance from the epicentrum increases The violence and the time of appearance of the shock vary in all directions from this centre Irregularities of rock texture and structure interfere with the regularity of these variations The propagation of the earthquake wave under ideal conditions is shown in the accompanying diagram, where *E* represents the epicentrum and *A B* coseismal curves

Among the geological effects of earthquakes the destruction of life is best known, but the shaking of the ground sometimes changes the topography, shaking loose earth about and opening fissures in the ground and rocks When the earthquake originates under the sea a great water wave is raised This, advancing on neighboring shelving coasts, so increases in height as to wash over the lower land with highly destructive effects These earthquake water waves have an important influence on sedimentation in certain places, and the jarring of the sea floor and the ocean water sometimes causes a great destruction of life, which aids in the formation and preservation of fossils If the jarring is too frequent, however, the tendency is towards extinction of life in the region subjected to the jarring See EARTHQUAKE

Hot Springs and Geysers. Water is everywhere percolating through the upper layers of the crust Reaching fissures, it often rises to the surface, forming large and permanent springs This water is frequently heated in its passage, sometimes through the influence of heat-producing chemical changes in the rock, sometimes deriving its heat from rocks whose temperature has been raised by the friction caused by slipping along fault planes, sometimes being warmed by the presence of intruded masses of lava The time required for the cooling of great masses of intruded melted rock is so great that hot springs and geysers might be caused by them for many centuries

The heated waters take many mineral substances into solution in their passage through the rocks On reaching the surface this is often evident in the deposits made near the outlet as the water cools For example, the geysers of the Yellowstone precipitate silica, the hot springs carbonate of lime Many hot springs have medicinal properties because of the minerals in solution A great variety of mineral matter is carried by the hot water, and even veins of precious metals are formed by it See GEYSER, THERMAL SPRING

Formation of Ore Deposits Heated water under pressure in the rocks is a potent chemical reagent It soon becomes alkaline or acidic from substances derived from the rocks and in this condition dissolves and changes minerals in a complex way. As it circulates through the crust, the condition of this water is constantly changing—growing warmer or cooler, receiving accessions of water from different sources, and obtaining various substances from the rocks through which it passes Under these changing conditions mineral substances may be dissolved in one place only to be subsequently deposited elsewhere Nor is the activity confined to highly heated water. The surface waters descending through the rocks also dissolve and deposit, as

is illustrated especially well in certain deposits of iron ores However, the conditions most favoring the formation of mineral veins are the presence of heated water and of channels which permit its circulation Of channels the most important are fault planes, joints, and fissures Since these are most abundant in the mountain regions, and since mountains most commonly have associated igneous phenomena by which the water is heated, or which themselves may give off hot waters and gases, such regions are especially favorable for mineral deposit In addition, the igneous rocks contain the greatest store of the metallic elements, and hence their presence is important as a source of supply of the metals All these conditions prevail in the mountainous sections of the western United States, one of the great mineral regions of the world See ORE DEPOSITS

Metamorphism. The phenomena of mountain building and igneous activity are favorable to that alteration of rocks which is included under the term 'metamorphism" Heat, hot solutions and vapors, and great pressure are effective in changing the character of rocks This alteration may be local, through contact with intruded masses of igneous rock, when it is called contact metamorphism; or it may be widespread, through intense and extensive mountain building, when it is known as regional metamorphism In each case the resulting changes are similar, though the alteration is usually carried to a far greater degree in regional than in contact metamorphism Metamorphism has also been subdivided, according to the agency which has predominated, into hydrometamorphism, thermometamorphism, and dynamometamorphism

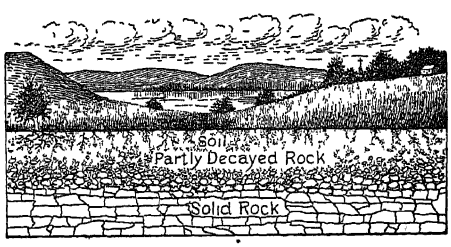
All rocks in a region of metamorphism are involved, and the resulting changes are independent of the origin of rock, being determined by the nature of the metamorphism and the composition of the rock subjected to the change Sometimes the alteration is so complete that no trace is left to tell the original character of the rock, not even the general class to which it belonged, and there are some geologists who believe that in some cases metamorphism has been carried to the extreme of actual melting, or, at least, to the reduction of the rock to a plastic condition On the other extreme, some rocks are so slightly altered that their original condition is easily recognized, e g, pebbles of conglomerate, elongated and stretched out of shape, are sometimes found, bedding planes in some slates are still observable crossing the planes of cleavage, distorted fossils may be present, and beds of marble may be traced to their origin from limestone strata, or quartzite to a previous condition of sandstone The genesis of even the highly metamorphosed schists and gneisses may at times be traced by following along the beds to some less intensely metamorphosed section containing fossils, or other indications of their origin Thus, it is known that some of the highly altered beds of metamorphic rocks in the Alps were deposited in the Tertiary sea and metamorphosed during the building of the Alps in late Tertiary time. See METAMORPHISM

Weathering Of an entirely opposite character to metamorphism is that change in rocks which results from contact with the air In the processes of metamorphism the materials of rocks are rearranged, and in most cases bound more closely together, in the processes of weathering the materials are weakened and the rock caused to disintegrate and fall apart Weathering, like other geological processes, is a complex phenomenon resulting from a cooperation of various agencies Most of the agencies of weathering operate both chemically and mechanically

Air aids in the weathering of rocks by supplying oxygen, carbon dioxide, and other substances for chemical changes Through the wind it performs mechanical work Heat and cold, by causing contraction and expansion, aid in the breaking up of the rocks Percolating waters cause many chemical changes, especially by the aid of oxygen from the air, carbon dioxide from air and decaying vegetation, and organic acids, derived from plant decay Mechanically water is important when the rain drop strikes the ground, and when frost is formed in soil and rocks, the expansive force rends the materials apart with great effect Plants are also important, both chemically and mechanically Chemically they work by obtaining plant food from the earth, mechanically by the intrusion of their roots in soil and rock Burrowing animals are likewise effective agents of weathering, especially the ants and earthworms, which bring fresh materials to the surface and make the soil more porous

The effectiveness of the agencies of weathering varies with the nature and situation of the rock All rocks are entered by water, but some are far more porous than others Some minerals are easily soluble, some relatively insoluble, some decay with ease, others are almost indestructible But even the densest rock, made of the most indestructible of minerals, will crumble, though slowly, in the weather On steep slopes, as on mountain tops and cliffs, the bare rock is exposed to the weather by the aid of gravity, which removes the fragments as they fall, but on more level ground some of the weathered material remains as a blanket, protecting the rock from some of the agencies of weathering Arid lands are unfavorable places for weathering, because of the general absence of water A forested country is protected by the forest cover, and it is probable that this protective effect is of more importance than its destructive effect In damp tropical regions rock decay is of most importance, in cold climates frost is one of the most important agencies

Of the effects of weathering, by far the most important is the disintegration of the rock to form soil Whenever the slope is not too steep,



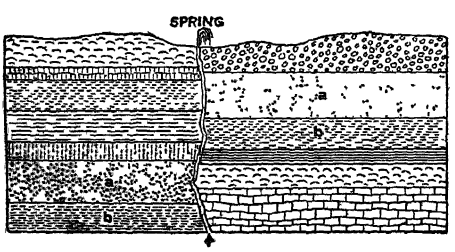
RESIDUAL SOIL

the disintegrated fragments accumulate as soil cover Such a soil of rock decay is called a residual soil, because it is a residuum of mineral decay after all the easily soluble portions have been removed By far the greater part of the

land has a soil cover of this origin. A second highly important effect of weathering is the preparation of rock for transportation, and were it not for weathering geological history would have been far different The rock waste falls or is washed into the streams which use it as tools for carving valleys, as the material for building flood plains and deltas, and as contributions to the deposits of sediment which are made in the sea.

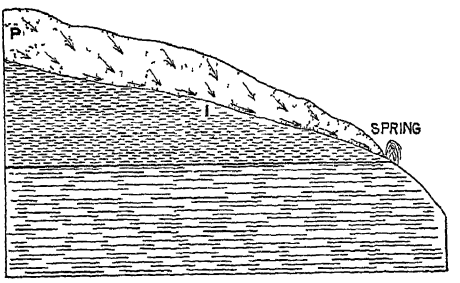
Wind Work As an agent of geological change, the importance of the wind is not fully recognized by dwellers in humid regions Aside from its influence in weathering, mentioned above, the wind does effective work in two classes of regions, viz, in arid lands and on seacoasts In both places the protective covering of vegetation is absent, and in both places fine-grained rock fragments are dried and exposed to the wind In these positions the sand is borne about by the wind and piled into irregular hills, or dunes The friction of the sand particles over one another grinds them down; and, when blown against rocks and cliffs, a natural sand blast is in operation, with the result that the rocks are worn away. An additional effect of wind action is the construction of land in the sea. Where sand bars are thrown up by the waves, or where coral beaches are built on coral reefs, the wind completes the construction of land by building dunes of the fragments washed ashore The blowing of sand and dust out to sea adds to the sediments gathering there The distribution of volcanic ash over wide areas is another important geological effect of the wind Indirectly the wind is exceedingly potent as the transporter of vapor for rain, and as the force which causes the waves and currents in the ocean See WIND, DUNE, LOESS; ÆOLIAN ACCUMULATIONS.

Work of Underground Water. Water is ever percolating through the rocks of the crust, and this underground water is an effective agency of dynamic geology Much of this water returns to the surface after a short journey, and it is this which with rain keeps the rivers supplied Wells show its general presence in the surface rocks, and springs are places where favorable conditions have conspired to direct quantities of it back to the air. Among these favorable conditions are fault fissures, joint



SPRING ALONG FAULT PLANE.

planes, and relatively impervious layers. The percolation of water along such layers when they rest in unstable positions is an important cause of landslides Where rocks, such as limestone, are made of minerals that are soluble, the passage of water usually dissolves out underground channel ways. Along the joint and bedding planes the rock is slowly dissolved away, the water entering from sink holes at the surface and emerging as springs on some valley side into which the underground water is draining These caverns are often ornamented with stalactites and stalagmites, caused by the deposit of carbonate of lime which the water must

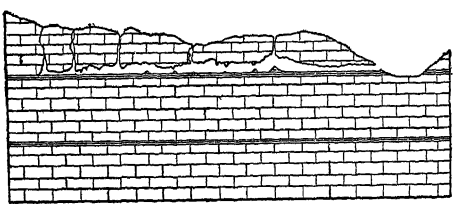


SPRING ON HILLSIDE

P, porous rock, *I*, impervious strata

precipitate on emerging from the rock into the cave air See CAVE

River Work. In draining from the land the water carries a load of mineral matter in solution and in suspension. The former is mainly supplied from the underground water, though some is obtained from the river bed The suspended material is in part derived from the inwash of soil by the rains, in part from materials obtained by weathering of the valley sides, and in part by the direct work of the rivers, using the rock materials as tools of excavation. There



FORMATION OF CAVE IN LIMESTONE

is a great variation in the work which rivers are doing Some have such a rock load, on so gentle a slope that they cannot cut, but must build up, their beds. Others are rapidly excavating their beds and have cut deep gorges and cañons, which they are still deepening Their rate of work varies with the volume of water, the slope, the nature of the rock, and the amount and nature of the load of rock waste being transported Since the rate of work varies with the kind of rock which is being excavated, rivers that are engaged in deepening their valleys are liable to have falls and rapids because of unequal erosion on rocks of different hardness

One of the great geological results of this river work is the formation of valleys Where a stream is rapidly cutting, its valley is narrow and steep-sided Even in this case the valley is broader than the stream, partly because by its meandering course the river undercuts its bank and partly because weathering is broadening the valley Weathering continues even after the stream has ceased its downcutting, and therefore the valley continues to grow broader and broader, the stream removing the materials which this weathering supplies Thus, as a transporting agent, rivers, in coöperation with

weathering, which prepares and supplies the materials, are important factors long after they have ceased to cut directly into the rock

In the transfer of the waste of the land to the sea some of the material halts on the way Even the most rapid of streams, bearing the coarsest of fragments, furnish illustrations of this in their beds, in bars, and in narrow strips of deposit on their margins The larger streams, especially near their mouths, are often bordered by flood plains in which sediment is laid aside in flood time and in which, as the stream slowly changes its course by meandering, portions are being taken up on the side of cutting, while other portions of the river load are being deposited on the opposite side Such flood-plain deposits are built of fine-grained fragments, making a very fertile soil See EROSION, VALLEY, FLOOD PLAIN, DELTA, ETC

The Work of Lakes. Lakes are formed by some interference with drainage, usually a dam across some stream course, as the growth of a mountain barrier, a lava flow, or a dam of glacial deposit The lake waves work on the coast line, cliffs are cut, beaches are formed, and on these the fragments are ground finer. The rivers which enter the lake add still more to the deposit accumulated, forming deltas where they enter, but giving the finer material to the currents for transportation off into the lake. Weathering adds to the supply of sediment, and the wind drifts more rock fragments to the water In the quiet lake waters, even the finest of this sediment in time settles to the bottom Given time, then, the fate of lakes is to be filled, and the truth of this has been graphically stated in the remark that "rivers are the mortal enemies of lakes" But rivers are not allowed to do the entire work of lake destruction, as has been shown Aside from the agencies of lake-filling mentioned, the influence of organisms is effective The shells of animals and the accumulations of plant remains are also factors of importance. In the last stages of lake destruction water-loving plants—the reeds, rushes, and sphagnum mosses—are effective, both by their own accumulation and by their interference with waves and currents, thus aiding in the deposit of rock fragments Many filled lakes have been transformed by plant growth to bogs in the northern climates, where the sphagnum moss grows readily By the processes of lake-filling important accumulations of sedimentary rocks are made, and in some countries, as the western United States, where large lakes were formed behind mountain dams in recent geological periods, there are extensive areas occupied by lake-formed strata Coal beds, representing the stages of organic influence, are a part of these lake beds In arid climates, where evaporation exceeds the rainfall, the lake waters are lowered below the outlet, then, year by year, the mineral substances brought in solution by the incoming water, and left behind in the lake as the water is evaporated, become more and more concentrated Such lakes become salt and, if the process continues, deposit layers of salt, gypsum, and other substances Before this stage is reached, however, the precipitation of carbonate of lime takes place because this substance is relatively less soluble than the chlorides and sulphates. Beds of these precipitated rocks are common in the West, where they have been recently formed and, in fact, are in some cases still forming; they are also found among the strata of earlier ages when similar conditions existed See LAKE

Glacier Work Glacier action at present is confined to high mountains or to high latitudes There are three classes—valley, or alpine, plateau, and continental Of the last named, Greenland and the Antarctic furnish illustrations, and during the Glacial period (q v) continental glaciers covered northwestern Europe and northern North America Hence glacial action assumes wider importance than it would if considered solely from the standpoint of the work of present glaciers The erosive action of glaciers seems to be very great where the ice movement is free along valleys The weight of the ice, pressing its grinding tools on the under rock and slowly dragging over it, grooves and polishes the rock and deepens as well as broadens the valleys The results of this work are readily seen in a region from which vigorous ice action has disappeared The material dragged along by the ice is a mixture of large and small rock fragments in various stages of reduction by the grinding process At the ice front, or when the ice melts away, this material is released and, falling to the ground, accumulates as an unassorted mixture of materials, because the ice carried large and small fragments with equal facility This glacier deposit is known as till, or boulder clay If the ice front stands long enough along a single line, the accumulation of ice-borne débris forms a moraine The melting of the ice releases much water along the front, and this water assorts a portion of the till, causing clay deposits in one place, sand and gravel in other places By the glacier-borne floods large quantities of rock fragments are carried far away from the ice front and deposited in the river valleys and even borne to sea Where glaciers enter the sea there is a direct contribution of material to the ocean, and by means of the icebergs which break from the glaciers some of the rock fragments are carried far to sea The deposits made directly by the ice, and by water supplied by ice melting, cover northeastern North America and northwestern Europe, forming the soil of those regions These glacial deposits vary greatly in form and in texture according to the exact nature of the formation, and they vary also in depth Many important effects have been produced by these deposits, especially on the drainage The great number of lakes in Europe and America are mostly due to some form of glacial interference with drainage, and the gorges and waterfalls are due to the turning aside of streams by glacial deposits See GLACIER, BOULDER CLAY, ETC

Ocean Work. The most powerful agent of erosion in the ocean is the wind wave By its direct blow, and by hurling and grinding rock fragments together, waves are wearing coast lines back From the cliffs thus formed much material is supplied by weathering, which is assisted by the influence of the salt and other soluble substances with which the rock is sprinkled by the ocean spray The waves, approaching the coast diagonally, drift the rock fragments along the coast, and this movement is further aided by the wind and wave-formed currents These fragments often find lodgment in embayments, forming beaches Such beaches are mills in which the rock fragments are further ground down The finer fragments obtained by the waves, added to those brought by

the rivers, the wind, and weathering agencies, are in part drifted out to sea by the undertow, the wind-formed currents, and the tidal currents Rarely the tides have an erosive influence, but with ocean currents and ocean drifts they are important transporting agents The currents and drifts are also geological factors in modifying climate and in bringing food to sea animals The materials derived from the land by the various agencies are strewn over the sea bottom near the land—the coarsest near the coast, the finest out to sea Sometimes the sediment comes to the sea in greater quantities than the agencies of the ocean are able to remove Then they accumulate as bars along the coast, and the waves expend their energies on the bars, leaving the protected coast behind the bars untouched If the sea bottom is sinking, great beds of conglomerate, sand, and clay may be accumulated, if it is rising, the beds previously formed are added to the land, as along the eastern United States south of New York More than half of the rocks of all the continents were formed on subsiding sea beds near land areas and made of the land waste Later they were elevated to form parts of the continents, and they have often been built into great mountains, such as the Alps, Appalachian, and Rocky mountains

In the sediments accumulating on the sea floor animal remains are always present, and as the distance from the coast increases, these become of increasing importance because of the diminution of the supply of rock waste Far from the coasts, in the open ocean, the contributions of land waste are so slight that the sea-floor deposit is made almost exclusively of animal remains, especially of the tests of minute surface animalculæ which have dropped to the sea floor. This forms an ooze, variously named from the animal forms predominating Of these the most numerous are usually the Globigerina, low forms of Foraminifera Chalk beds are made of Globigerina ooze, raised to the surface and consolidated In the very deepest oceans only the insoluble residue of these shells continues to the bottom, forming a red clay deposit In this clay are found also volcanic dust, meteoric iron, and the ear bones of whales, indicating its extremely slow accumulation About one-third of the sea floor is covered by red clay, and one-third by ooze, yet red clay is not found on the continents, and ooze rarely This seems to indicate a permanency of the deep ocean basins, and that the ocean-formed rocks of the land were mostly made in those shallow parts of the ocean which bordered the continents

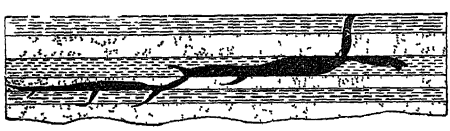
Organic influences are not confined to the deposits of the deep sea Grasslike plants and, in tropical regions, mangrove trees are effective in aiding deposit on many coasts, especially in protected spots. Shell-building animals also form deposits in addition to contributing to the elastic sediments But far the most important of the coastal organic influences are those of the corals, which build reefs along the coasts, and islands on shoals in the sea The coral fragments are built into islands by uplift, by waves and winds, and coral ooze is strewn over the sea floor near the reefs by the grinding of the waves and transportation by the currents. By these means beds of limestone are being accumulated See OCEAN, DEEP-SEA EXPLORATION; CORAL ISLAND

Work of Life. As a geological agent, life is important in many respects, and reference to life has already been frequently made It helps to disintegrate rocks, to transport fragments, and to make deposits of rock materials All forms of life have geological influence, and man, the highest and most powerful of the animals, has come to be one of the most important of the geological agents By modifying and destroying animals and plants, by removing the forests, by interfering with rivers, lakes, and oceans, by excavations in the ground, and by many other actions, man is aiding in geological change, and in a way more varied and effective than any other organic agency

Denudation The land uplifted by continent movements, mountain building, and volcanic activity is being attacked by the agents of denudation The rocks are dissected, the land made irregular, and the fragments carried to the sea Mountains are planed down, volcanoes removed to their very roots, coast lines cut back, and the structure of the upper parts of the crust revealed Thousands of feet have been removed from all of the continents, and new land has been made of the fragments deposited in the sea and then lifted to the air by the forces from within the earth The work of destruction by the agencies of denudation is partly repaired by uplift A study of the form of land resulting from this interaction of uplifting and downcutting belongs to physiography (q v)

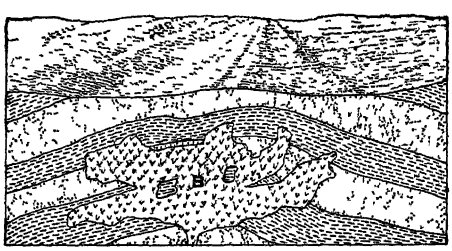
STRUCTURAL GEOLOGY

The rocks of the crust, considered under the three headings of sedimentary, igneous, and metamorphic, present certain characteristic structural features When in the form of flows the igneous rocks are arranged in layers, and they are often covered with beds of sedimentary



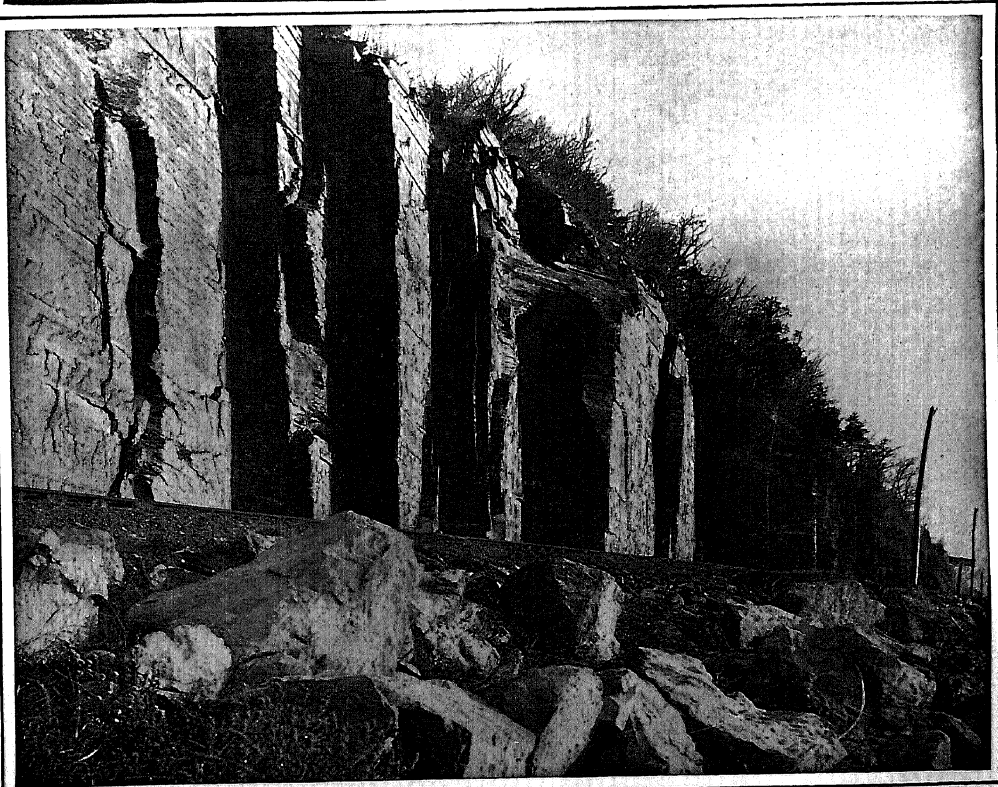
INTRUDED SHEET OF IGNEOUS ROCK

strata Sheetlike intrusions of lava are also in beds But dikes, bosses, and laccoliths are more irregular These igneous rocks vary in texture, as has been already stated Joint planes are commonly present, being due to contraction of the cooling masses which results in a breaking of the rocks These joints at times assume al-



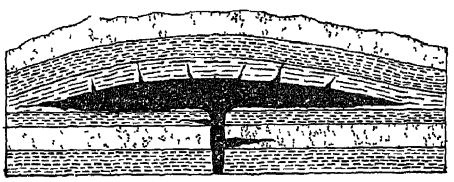
BOSS OF INTRUDED ROCK (*B*)

most mathematical regularity, as in the hexagonal columnar jointing of Fingal's Cave and the Giant's Causeway Many of the metamorphic rocks inherit some of the characteristics of the rock from which they were derived But, when



ANTICLINAL FOLD, CHESAPEAKE & OHIO CANAL, NEAR HANCOCK, WEST VIRGINIA (UPPER)
JOINT-PLANES IN ROCKS NEAR ITHACA, N. Y. (LOWER)

highly metamorphosed, they become massive and crystalline, resembling in this respect the igneous rocks However, owing to the influence of pressure, the metamorphosed rocks are characterized by a parallel development of their constituents, often very marked Veins are common in the metamorphic rocks, and the layers are often highly contorted under the strain of the tremendous pressure to which they have been subjected Joint planes of later origin are also present The sedimentary strata are characterized by arrangement in layers due to the assorting action of the agencies which have caused their accumulation This assortment is found both on a very small scale, represented by laminæ, and on a large scale, represented by changes in the nature of the material For example, a series of shales, with many laminæ, may grade downward to a sandstone and upward to a limestone The minor variations represent the influence of slight variations in the force or direction of currents or in the nature of material

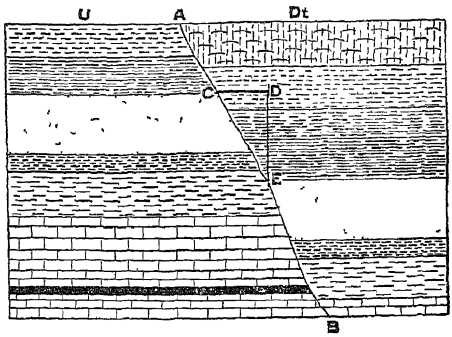


LACCOLITH

supplied, the larger changes indicate more extensive changes, such as uplift or depression, which completely alter the conditions under which the sedimentation is taking place A shallowing means coarser fragments, a deepening finer fragments, because of change in the position of the coast line The sedimentary beds have the shape of greatly flattened lenses, because they die out in all directions, but the beds of coarser fragments, having less extent, are more lens-shaped than those made of finer fragments.

The nature and structures of sedimentary rocks often reveal the manner of origin Coarseness indicates nearness to shore, limestone indicates abundant life, and the presence of currents, varying in velocity and direction, is indicated by cross, or current, bedding, in which the layers vary greatly in coarseness and in the direction and angle of inclination This form of bedding is caused by river, wave, and wind currents Ripple marks, rain prints, footprints of land animals, and mud cracks, formed by the cracking open of mud exposed to the sun, are also commonly found, indicating shallow-water origin for the deposits From such evidence a remarkably large proportion of the sedimentary beds are known to have been formed in shallow water While most of the rocks included in the sedimentary group are deposited as fragments, and hence are at first unconsolidated, the sedimentary strata of the land are mainly consolidated This consolidation is usually the result of the deposit of some kind of cement by percolating water. Carbonate of lime, some sort of iron, and silica are the common cements The presence of cementing materials in the ground water is illustrated by the replacement of woody matter by silica, forming petrified wood At times this cementing material gathers around centres, such as grains of sand or fossils, forming concretions.

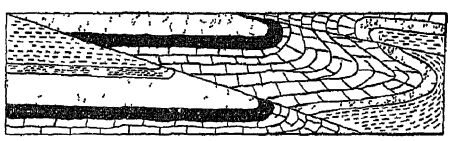
Aside from the bedding planes, the sedimentary rocks, as well as the other groups, are crossed by joint planes, which, with the bedding planes, cause the rock to break naturally into



FAULT

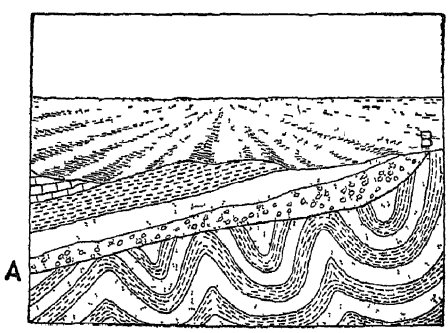
A B, fault plane, *D E*, throw, *U*, upthrow, *Dt*, downthrow

rhombic or cubical blocks, greatly aiding in quarrying operations Most of the jointing in sedimentary strata, and much of that in the igneous and metamorphic rocks, seems to be due to disturbances in the rock, which cause strains Under violent strains the rocks are often folded and faulted, especially among mountains This folding is sometimes very complex and amounts to real contortion A single fold, with a dip in



OVERTHRUST FAULT

but one direction, is called a monocline, the ordinary uparching of rocks is known as an anticline, and the downfolding as a syncline These may be symmetrical or unsymmetrical, and in cases are even overturned or recumbent Under favorable conditions the rock under strain breaks in place of bending, forming faults Some of the faults are dislocations of only a



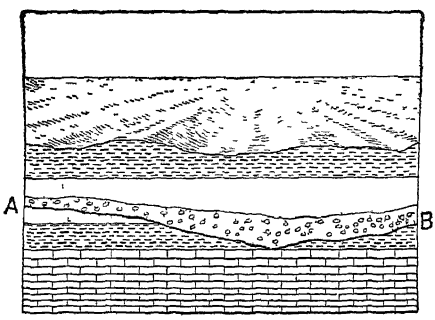
UNCONFORMITY

A B, between two series of horizontal sedimentary rocks.

few inches, some of thousands of feet. Ordinarily the plane of faulting is approximately vertical, but in some cases, as when folds are overturned and the folding continues to the point of breakage, faults are developed with

nearly horizontal planes Such faults are called overthrust faults, and the plane a thrust plane, because the rocks on the upper side are thrust over those on the lower side

Ordinarily the sedimentary strata are horizontally deposited in the sea, and when lifted to form a part of the land they are usually still approximately horizontal With mountain disturbance, however, the rock layers are thrown into inclined positions In plains and plateaus, on the other hand, the rocks are prevailingly horizontal and there is little disturbance Owing to the volcanic activity accompanying mountain formation, and to the great pressure under which the strata are placed in folding, both volcanic and metamorphic rocks are common among mountains, but are rarely found in plains By reason of the instability of the earth's crust, land is often lowered below sea level subsequent to a period of denudation Then sedimentary deposits are laid down on the submerged surface, after which the area may be raised once more into land The plane between the new



UNCONFORMITY

A B, between sedimentary rocks and a series of folded rocks.

deposit and the old land marks an unconformity, and the upper rocks are said to rest unconformably upon the lower. An unconformity thus represents a gap in rock formation and in the life record and is often of great use in interpreting geological history See JOINTS, ANTICLINE; SYNCLINE, DIKE, FAULT, ETC

PHYSIOGRAPHIC GEOLOGY

This branch of geology is specifically treated under the heading of PHYSIOGRAPHY, so that only the general principles will be here stated Physiography is concerned with a study of the forms assumed by the surface of the crust and the origin of these forms Both on the ocean bottom and on the continents, plains, mountains, and volcanoes have been built, and each of these crust forms has a history This history may start with the origin—the plain is an old lake bed, or a raised sea bottom, or a lava plain, etc After its origin changes of one kind or another have occurred, giving it its present modified characteristics For example, rivers may have developed upon it, or the agencies of the sea may be at work upon it, or glaciers may have passed over it It is a question of physiographic geology to decide what has happened since the origin of a given land form.

In recent years, largely as a result of the work done by Professor Davis, it has been found that land forms normally pass through a life history which can be stated in terms of youth, maturity, and old age The characteristics of a newly formed coast line, a young stream valley, or a mature plain are readily seen These aspects of physiography may be considered briefly by a few examples A young stream has steep sides, because there has not been time enough for weathering to broaden them, it is certain to have falls or rapids, if the rock materials are of variable hardness, because it has not yet established a grade, and is therefore busily cutting in its bed and discovering rock irregularities, it may have lakes, because there has not been time enough for the rivers to fill them, and its tributaries are liable to be few and its divides poorly developed, for want of time A mature stream has lost these characteristics It has many tributaries and well-defined divides, but no waterfalls, excepting possibly in the headwater regions Lakes are absent, and the valley is broad and its side slopes moderate This is the normal development, but accidents may occur to interfere with this development For example, lava floods may cross the valley or fill it, glacial deposits may be laid down to embarrass the stream, and the land may be raised or depressed A mountain or a plain, or any other land feature, when newly formed and hence young, will have, therefore, certain characteristics, but with increasing age these will be changed For example, drainage, at first vigorous, will dissect the land form, making it more irregular A plain may then become a hilly region, and a mountain chain will become very rugged Weathering and erosion will later reduce the irregularities, causing the mountain to become more level and the plain once more to approach a level condition See PHYSIOGRAPHY

STRATIGRAPHIC GEOLOGY

The fossil organisms, whose study forms the basis of paleontology or biogeology, in connection with a study of the rocks themselves, are useful in telling of past changes in climate and physical geography But perhaps their most important service to the geologist is as factors in the determination of the geological age of the rocks Their use in this respect depends upon two important principles—one that the strata are normally found in the order of their deposition, the oldest below, the highest above This is known as the law of superposition of strata The second principle is that, in the evolution of life on the globe, there has been a general upward progression A knowledge of the nature of this progression, therefore, makes it possible, by a study of the fossils of given strata, to tell in what stage of life development they live and to assign an age to the strata in which they are found The use of the term "age" in this connection naturally does not mean years A term like the Devonian period might be considered to represent in geological history what the term "Bronze age" means when applied to human history It refers to a stage of life development

Prior to the enunciation of these principles by William Smith about a century ago, there had been various attempts to classify the strata An early attempt employed the three terms Primary, Secondary, and Alluvial A later attempt elaborated this time division as follows Primitive, Transition, Secondary, Tertiary, and Alluvial. In the classification at present widely in

use, the term "Tertiary" is still employed, and "Secondary" is occasionally met in the writings of geologists of a few years ago At one period lithological data were used in classifying the strata, on the assumption that at certain periods widespread conditions permitted the general deposit of rocks with certain lithological characteristics Thus, there was a Carboniferous period, or age of coal, an Old and a New Red Sandstone period, a Cretaceous, or Chalk period, an Oolitic period, etc Several of these inherited terms are still in use, even now that it is known that lithological characteristics were not universal With the introduction of the life record it was found possible to define periods of geological history with more definiteness, often placing their boundaries at unconformities which marked a break in the preservation of the life record, thus making a good dividing line This study has led to the necessity for the introduction of new names and the abandonment of some of the old ones. Very commonly the new names are geographic—Devonian, from Devonshire, England, and Permian, from Perm, Russia, e g—being adopted from the region where the study necessitating the new name was made The use of fossils has also made it possible to subdivide the larger divisions of geologic history, and the names thus introduced are usually geographical and of local significance Thus, those of Texas differ from those of New York, California, India, or England But the large divisions are of world-wide application The following table gives the names commonly in use in America for the main divisions.

DIVISIONS OF GEOLOGICAL TIME

Cenozoic	Quarternary	Recent Pleistocene (Glacial period)
	Tertiary	Pliocene Miocene Oligocene Eocene
Mesozoic	Cretaceous Jurassic Triassic	Upper Cretaceous Lower Cretaceous
Paleozoic	Permian Carboniferous	Coal Measures Subcarboniferous
	Devonian	Upper Devonian Middle Devonian Lower Devonian
	Upper Silurian or Silurian	Cayugan. Niagaran Oswegan.
	Lower Silurian or Ordovician	Lorraine Trenton Canadian
	Cambrian	Upper Cambrian Middle Cambrian Lower Cambrian
Proterozoic	Keweenawan Animikean Huronian	
Archeozoic	Archean Complex (Laurentian and Keewatin)	

In a given region a broad statement of the stratigraphic geology would start with the oldest rocks, perhaps the Archean, and continue down to the present It would treat of the fossils, their characteristics, variations, and associations, and it would include a study of the structure, position, and relations of the rocks themselves These studies would be applied to an interpretation of the history of the region, both in general and in detail, the evolution of life, the climate and its variations, the relation of sea and land, and their variations in relation, the nature of sedimentation and the conditions accompanying it, the geographic conditions and the changes in past geography, with causes, periods of volcanic activity and their effects, the growth of mountains and their reduction, in a word, all the many and complex changes and interactions and interrelations of conditions which have helped to make the geological history It is such a complicated subject that no adequate abstract is possible in an article of this scope In fact, stratigraphic geology, being a history of the past, differs for each locality and can be properly discussed only in treatises on geology Much on stratigraphic geology is, however, given in various articles on specific topics See PALEONTOLOGY, PALEOBOTANY, ARCHEAN SYSTEM, CAMBRIAN SYSTEM, SILURIAN SYSTEM, ETC

GLACIAL GEOLOGY

One of the last great episodes in geological history was the advent of great ice sheets from northern lands, invading and overwhelming northern North America and northwestern Europe Because of its recency (in the Pleistocene period), the record of this invasion is clear It lowered the hills, deepened the valleys, scoured, grooved, and polished the rocks, and transported soil and bowlders in its onward march, leaving them in complex deposits when it melted back These deposits clogged the valleys, turning streams aside and causing them to carve new valleys, which are now gorges with rapids and falls, and by making dams across the streams many lakes were ponded back in the stream valleys In its advance the ice sheet drove out both animal and plant life, and many interesting effects on life were produced A study of these records, and an interpretation of the events which they record, are the province of glacial geology

The time of coming, the length of duration of the ice invasion, and the length of time since its withdrawal, are not known in years From 25,000 to 50,000 years is the estimated time since the withdrawal of the ice from the northern part of the United States The duration of the ice invasion was many times the length of the post-Glacial period and was great enough for a large amount of work to be performed The beginning and the end of the Glacial period are included in the Pleistocene, so that even the time of coming is a recent geological event, being post-Tertiary There is increasing evidence that the Glacial period was complex, consisting of several ice advances, with intermediate periods of deglaciation, or interglacial epochs

Much discussion has arisen on the question of the cause of the Glacial period, without, however, arriving at definite results That the land in the glaciated regions at the beginning of the Glacial period was higher than now is demonstrated, and it seems probable that, could the land be once more raised to that elevation, glaciation would again set in There is reason to believe that the ice invasion such as marked the Pleistocene was not a unique event Characteristic glacial materials have been found in the Permian system of South Africa, India, and Australia, and some geologists believe that they occur also as far back as Cambrian time Whatever the causes may have been, there is no rea-

son to suppose they reached their single culmination during the Pleistocene period See GLACIAL PERIOD

ECONOMIC GEOLOGY

A great number of geological products have economic value, and our industrial development of the present time is dependent upon these products The investigation of these from the standpoint of their occurrence, origin, and uses belongs to the economic geologist. Of the topics of economic geology, undoubtedly the most important is the soil Its origin, distribution, variations in texture and chemical composition, and the means of bettering it and of properly utilizing it, are questions of high importance Building products—the building stones, cement materials, and clays—form a second important group, mineral fuels, including coal, natural gas, and petroleum, a third group, and metallic products, including both the precious and baser metals, form a fourth group Besides these, there are many lesser products—the precious stones, abrasive materials, salt, gypsum, fertilizers, etc The number of industries dependent upon this varied list of geological products and the vital relation of several of them to modern civilization show the value of a thorough and scientific knowledge of the nature and cause of their occurrence It is the importance of this economic aspect of geology that has led governments, both state and national, to support expensive geological surveys For a scientific study of economic geology, other aspects of geology must also be considered, consequently the whole field of geology has profited from the need of study of the economic aspect See ORE DEPOSITS; MINING

THE HISTORY OF GEOLOGY

Geology ranks as one of the youngest of the sciences In the latter part of the eighteenth century the discussion was being waged with warmth by Hutton and his followers on the one hand, and Werner and his followers on the other hand, as to whether any but the most recent igneous rocks were to be ascribed to other than aqueous agencies, as Werner affirmed Catastrophism was rampant, and articles on that phase of natural philosophy which dealt with the earth history were mainly philosophical polemics defending some hypothesis The clergy took a share in the discussions, opposing any theory of earth history which seemed at variance with the then existing dogmas of theology It had not yet come to be the custom in the natural sciences to gather facts patiently, weigh them carefully, and endeavor to draw logical conclusions from them Rather it seems to have been the custom to take such facts as appeared, philosophize upon them, and defend the conclusions with vigor against all comers and all fact

James Hutton, in 1785, sounded the first note of the new geology when he said that he saw "no traces of a beginning, no prospect of an end" This generalization, now a foundation stone of the geological structure, was based upon a wide and thoughtful study and upon many carefully gathered facts In Playfair's *Illustrations of the Huttonian Theory* are to be found many of the principles of modern geology A second great epoch in the history of geology was the work of William Smith at the close of the eighteenth century As has been stated above, his work made possible the division of the geological record into ages based upon scientific principles His work, therefore, stands as the foundation of stratigraphic geology The work of Hutton and Smith made it possible for others to follow, and quickly facts began to accumulate and conclusions to be drawn which gave to geology the right to be considered as a separate science Sir Charles Lyell, sometimes called the founder of modern geology, gathered these results and added to them his own, putting them together as a system in his *Principles of Geology*, still a geological classic He vigorously promulgated his system, and was, without doubt, the greatest and most effective of geological teachers

In these earliest days of geology as a science Americans had but little share, but before the middle of the century James Hall, James D Dana, and others were vigorously at work on the geology of the North American continent State geological surveys were established in many of the States, government geological expeditions and surveys were started, and, finally, the present United States Geological Survey was organized Another event of great importance in the history of geology was the announcement of Agassiz's glacial hypothesis Prior to his announcement floods, and then floods with icebergs, relics of the earlier days of catastrophic geology, were appealed to in explanation of the phenomena of the drift Aside from its importance for the science of glacial geology, which it originated, Agassiz's doctrine of a glacial period was important as the destroyer of the last remnant of catastrophism from geological science Henceforward uniformitarianism was accepted and for a while perhaps too thoroughly accepted and too blindly followed, as a result of Lyell's energetic advocacy No longer was there any belief in the performance of geological work in a limited period of time, but moderate uniformity and great lapse of time were firmly established principles Perhaps to Darwin's doctrine of evolution, which Agassiz did not accept, is due the final establishment of the principle of a great lapse of geological time. Be this as it may, the promulgation of the doctrine of evolution was an event of great importance to geology, which made advance in certain phases of geology possible This theory was based in part on paleontological evidence, and geologists took a large share in its establishment The discussion which followed its announcement resembled in some respects the discussion on geological philosophy at the end of the preceding century

Out of the old natural philosophy have come several sciences, and out of each of these have developed several divisions, or subsciences, some of which may be classed as distinct sciences The field of geology is so large, and its problems are so varied, that, as the body of fact gathered by the army of workers has increased, it has become necessary to subdivide, and, as in all sciences, the tendency is ever towards narrower and narrower specialization The generation of geologists now passing away could be familiar with the whole field, as their teachers could be naturalists, and theirs natural philosophers In one sense this is unfortunate, but in others it is for the best, because with specialization the details of knowledge are best gathered. Some

day a geological Darwin will appear with large enough grasp of the subject to arrange the facts patiently gathered in the various fields and to see their bearing on the great and still unsolved problems of geology

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GE'OMAN'CY (from Gk γῆ, *gē*, the earth, and μαντεία, *manteia*, divination) Divination by means of signs from the earth See SUPERSTITION

GEOMET'RICAL OPTICS See LIGHT

GEOMET'RIC MEAN If three quantities, a, b, c, are in geometric progression, b is called the geometric mean between a and c. e g, 2, 4, 8 are three such numbers, 2 being the constant multiplier, and 4 is the geometric mean From the nature of the series,

$$\frac{a}{b}=\frac{b}{c}, \text{ or } b^2=ac, \text{ and } b=\sqrt{ac}.$$

The positive value of the square root is usually, but not necessarily, taken as the geometric mean when a and c are positive, the negative value being taken when a and c are negative, e g, the geometric mean between 2, 8 is $\sqrt{16}=+4$, but between -2, -8, it is $-\sqrt{16}=-4$. The several terms of a geometric series which lie between two numbers, as a, l, are called the geometric means between a, l The geometric mean of n positive real quantities is the positive value of the nth root of their product, e g, the geometric mean of 8, 27, 64 is $\sqrt{8 \quad 27 \quad 64} = 24$

GEOMETRIC PROGRESSION See SERIES

GEOM'ETRID MOTH See MEASURING WORM

GEOM'ETRY (Lat *geometria*, from Gk. γεωμετρία, *geometria*, from γεωμέτρης, *geōmetrēs*, geometer, from γῆ, *gē*, earth + μέτρον, *metron*, measure) The science of form Geometric concepts arise from the consideration of forms of actual objects, just as numerical concepts arise from the consideration of collections of objects, for example, the idea of a cube results from observing that the corresponding physical object, as a die, occupies a certain part of space This implies the first geometric assumption, viz, that space is divisible In this case it is divided into two parts, that within the cube and that outside of it Geometry considers only the former, the space occupied by a substance. This space is

called a geometric solid or simply a solid The boundary between the space and that outside of it is a surface A surface, being itself an element of space, is also divisible, and the boundary between two parts of it is called a line A line, in turn, is divisible by a point The number, comparative size, and position of these elements unite to make the concept cube With accurate ideas of point, line, surface, solid, it is easy to imagine a world of geometric figures formed by their combinations It is then only necessary to add concise definitions and axioms (q v) to found a system of geometry But the validity of these assumed premises must determine the validity and scope of the resulting science—a fact forcibly exemplified in the case of Euclidean geometry

Geometry was developed by the ancients, especially by the Greeks, to a high degree But their constructions and solutions in elementary geometry were generally effected by the use only of the straight edge and compasses (instruments corresponding to the geometric elements, straight line and circle) Their achievements were therefore limited, and such problems as the trisection of an angle, the duplication of a cube, and all those which cannot be expressed by equations of the first or second degree, remained unsolved until the introduction of other instruments The word "geometry" signifies land measure, and Herodotus attributes the origin of this science to the necessity of resurveying the Egyptian fields following each inundation of the Nile He refers to the plan of taxation enforced by Sesostris (Rameses II), which required a survey of the land Proclus also confirms the Egyptian origin of geometry by saying that Thales introduced this art from that country into Greece The greatest among the disciples of Thales was Pythagoras, who formulated deductive geometry and discovered many important propositions Among the illustrious successors of Pythagoras were Anaxagoras, Œnopides, Bryson, Antiphon, Hippocrates of Chios (who duplicated the cube, but not by elementary geometry), Zenodorus, Democritus, and Theodorus. To this list should be added the name of Plato, who introduced a new epoch in the science by formulating the method of geometric analysis and emphasizing the necessity of accurate definition Menæchmus, a contemporary of Plato, discovered the conic sections Among those who studied at the Academy of Plato were Eudoxus, who contributed extensively to the theory of proportion and the method of exhaustions, and to whom are due many theorems found in Euclid's *Elements*, and Aristotle, who improved many geometric definitions The name of Euclid (q v) marks another epoch in the history of geometry Euclid's work is remarkable, not for its originality, but for its simplicity and perfection as a logical system, based as it was on the discoveries of his predecessors This work of 15 books, called the *Elements*, has for over 2000 years formed the basis of elementary instruction in geometry wherever the science has been taught For the development of the geometry of conic sections we are indebted to Apollonius, of Perga, and to Archimedes The later Greeks also cultivated geometry enthusiastically, as is attested by Nicomedes and Hipparchus, and in the Christian era by Ptolemy and Pappus

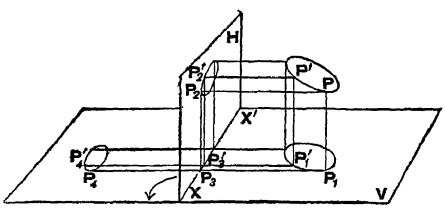
The elementary plane geometry ordinarily studied in the American schools is based directly, or indirectly through the work of Legendre, upon Euclid's *Elements* Of this classic work, the first four and the sixth "books" are devoted to plane geometry, i e, geometry in which the figures can all be imagined in one plane, even though, for purposes of superposition, they may be imagined as taken out of that plane in the course of the discussion Euclid's treatment of solid geometry, in which the figures are imagined as occupying three dimensions, was so meagre that the elementary treatment of the subject to-day differs quite radically from that in the *Elements* One of the principles of Euclid's work now most often violated is the attempt to avoid hypothetical constructions For Euclid seeks to show how to construct each of the figures needed before he makes use of it Thus, since it is impossible to trisect a general angle by the use of the compasses and the unmarked straight edge, Euclid would have been estopped from asking such a question as, Do the arms of an angle, and the two lines which trisect the angle, trisect a transversal of these lines? At present it is more common to assume that the necessary figures can be constructed and see what propositions can be proved from certain assumed postulates and axioms Later, the question of the figures admitting of construction by the compasses and straight edge is considered by itself Euclid's work has, until very recently, been the leading textbook on geometry in the schools of England and her colonies, but it has long since given way to a more modern treatment in most other countries and of late has been abandoned as the standard textbook in England

The basis of ancient geometry as set forth in the *Elements* went practically unchallenged until the nineteenth century The renewed interest in the science, growing out of the Renaissance, inspired the investigation of Euclid's assumptions and led mathematicians to seek to demonstrate the fifth postulate or twelfth axiom (given by Brill as the eleventh), viz, that two unlimited straight lines intersect on that side of a transversal on which the sum of the interior angles is less than a straight angle Among the eminent mathematicians who sought to show the dependence of this proposition upon those preceding it were Legendre and Gauss Lobachevsky and Bolyai were the first to construct a geometry independent of Euclid's assumption and thus to found the so-called non-Euclidean geometry Then at once followed a great advance towards exploring the new field, and from the researches of Riemann, Helmholtz, and Beltrami, it is concluded that 10 of the Euclidean assumptions are valid for all geometry, but that the one just mentioned and "two straight lines [or, more generally, two geodetic lines] include no space," are limited to the properties of particular space Riemann and Helmholtz formulated assumptions for a geometry in space of n-ply manifoldness and with constant curvature and observed that on the sphere, whose curvature is constant and positive, the sum of the angles of a triangle is less than a straight angle, this characterizing the space of the geometry of Bolyai and Lobachevsky Klein has designated these three geometries respectively, the elliptic, parabolic, and hyperbolic Starting with this broader view, many of the leading mathematicians of the last quarter of a century, including Cayley, Lie, Klein, Pasch, Killing, Fiedler, and Mansion, have given much

attention and made valuable contributions to the subject of geometry

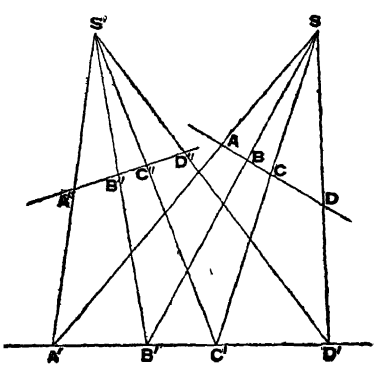
Without questioning the validity of Euclidean geometry, there have grown out of it in modern times two great systems—an analytic, or coordinate (see ANALYTIC GEOMETRY), and a synthetic, or "modern," geometry The latter embraces descriptive and projective geometry, although systems of coordinates have been introduced also in the second of these subjects

Descriptive Geometry This has for its object the representation of solids upon two planes at right angles to each other, these planes then being, for convenience, flattened out into a single plane This may be done in a variety of ways, but the original method is that of parallel rays perpendicular to the planes and known as the



orthographic, or orthogonal, projection These projections are commonly made, one on a horizontal plane (called the plane of the figure), and one on a vertical plane (called the elevation), e g, take a circle as the given figure, and let H V be the planes of projection intersecting in X X' Draw PP_2 $P'P'_2$, perpendicular to H, and PP_1, $P'P'_1$ perpendicular to V The rays from P determine the plane perpendicular to XX' at P_3 and those from P' determine a plane perpendicular to XX' at P'_3 Continuing in this way, the circle is projected into an ellipse on H and into an ellipse on V The plane V may now be revolved about XX' as an axis through 90°, causing the projection $P_2P'_2$ to form $P_4P'_4$, and thus representing two projections of the circle in the same plane This process is entirely reversible, from which it is clear that a figure may be constructed from its projections Descriptive geometry is a powerful agent in solving the problems of mechanics and the constructive arts, e g, in the planning of machinery, arches, and conduits

Projective Geometry As the name suggests, this investigates the properties of figures by



means of projections The fundamental idea is that of transforming a plane figure into a plane figure by means of projective pencils, or three-dimensional figures into three-dimensional figures by means of a sheaf of rays In the broader sense projective geometry also includes the study of the corresponding forms of various dimensions, e g, the axial pencil (planes with a common axis) corresponds to the pencil of rays (lines with a common point) If two ranges of points, as A, B, C and A', B', C', or as A, B, C and A'', B'', C'' in the accompanying figure, are such that the lines which join corresponding points concur, as at S, the two ranges are said to be in perspective, but A, B, C and A'', B'', C'' are said to be projective The anharmonic ratio (see ANHARMONIC RATIO) of projective ranges is constant, i e, $(A''B''C''D'') = (ABCD)$ This property forms the basis of the general definition of projective plane figures, which may be stated thus Any two plane figures in which for every point of the one there is a point in the other, and for every line in the one there is a line in the other, and so related that the anharmonic ratios of any corresponding ranges of four points or corresponding pencils of four lines are equal, are said to be projective

Hypergeometry Generalization has led geometers to imagine other spaces than that in which we live and to seek the properties of figures existing in space of more than three dimensions The result has been the building up of a geometry of hyperspace or of n dimensions Reasoning in this geometry is possible only by the use of symbols Since a line segment, i e, a figure of one dimension, is represented by an algebraic quantity of degree 1, such as a, since a square, having two dimensions, is represented by the algebraic expression a^2, and, finally, since a cube, having three dimensions, is represented by the algebraic expression a^3—the idea naturally suggests itself that some figure of four dimensions corresponds to the symbol a^4, and that, in general, some figure of n dimensions corresponds to the symbol a^n The fact that four dimensions cannot be represented in the three-dimensional space in which we live has little bearing upon the idea itself, a three-dimensional figure (a solid) cannot completely be represented on a plane, and yet mathematical thought involving the concept of three-dimensional space would remain logical and useful even if all actual figures were only two-dimensional

The idea of the fourth dimension thrusts itself upon the mind even more prominently in studying rectangular coordinates in analytic geometry, $ax = b$ represents a point, one axis being necessary, $ax + by = c$ represents a line, two axes being necessary, and $ax + by + cz = d$ represents a plane, three axes being necessary This suggests that $ax + by + cz + dw = e$ may represent a three-dimensional figure in a four-dimensional space It is evident that, just as we can draw in a plane the nets of the five regular bodies, we ought to be able, by analogy, to model in three-dimensional space the solid nets of all the six structures of four-dimensional space corresponding to the five regular bodies This has been done by Schlegel the models being made by Brill, of Darmstadt The figure corresponding to the square and cube may be described as follows It is bounded by 8 cubes, just as the cube is bounded by 6 squares, it has 16 corners, 24 squares, and 32 edges, so that from every corner 4 edges, 6 squares, and 4 cubes proceed, and from every edge 3 squares and 3 cubes Thus, reasoning by analogies, mathematicians have

gradually developed higher geometric systems and have succeeded in greatly extending the scope of geometry The idea of higher dimensions has been brought somewhat into disrepute owing to the efforts of the followers of Professor Zollner, of Leipzig, to explain the phenomena of spiritualism by making the fourth-dimensional world the abode of spirits Nevertheless, mathematicians agree as to the great practical value of the idea, inasmuch as it leads to important simplifications of mathematical language, and especially inasmuch as by its perfect generality it gives remarkable clearness to the concepts of real geometry A reasonable mathematical treatment of the subject may be found in Schubert's essay on the "Fourth Dimension," in his *Mathematical Essays and Recreations* (Chicago, 1898), and in Manning, *The Fourth Dimension* (New York, 1910)

The phases of modern geometry are closely interwoven in their historic as well as in their logical development Monge, the father of modern geometry, published his *Géométrie descriptive* in 1800, five years later the work of his pupil, Lacroix, appeared, *Essais sur l'enseignement en général, et sur celui des mathématiques en particulier* Following his works were those of Hachette (1812, 1818, 1821), and later Leroy (1842), Olivier (1845), De la Gournerie (1860) In Germany leading contributors have been Ziegler (1843), Anger (1858), Fiedler (3d ed, 1883–88), and Wiener (1884–87) Monge did not confine his labors to descriptive geometry, he set forth the fundamental theorem of reciprocal polars, though not in modern language, gave some treatment of ruled surfaces, and extended the theory of polars to quadrics Monge and his school concerned themselves especially with the theory of form, but Desargues, Pascal, and Carnot treated chiefly the metrical relations of figures. Carnot investigated those relations in particular connected with the theory of transversals, in his works *Géométrie de position* (1803), *Théorie des transversales* (1806). The present geometry of position (*Geometrie der Lage*) has little in common with Carnot's *Géométrie de position.*

Although Newton had discovered that all curves of the third order can be derived by central projection from five fundamental types, the origin of projective geometry is generally attributed to Poncelet (1822) He first made prominent the power of the projective relations, and the principle of continuity in research. Möbius followed Poncelet, making much use of anharmonic ratios in his *Barycentrischer Calcul* (1827) The anharmonic point and line properties of conics have been further elaborated by Brianchon, Chasles, Steiner, and Von Staudt Plucker applied the theory of transversals to curves, and Salmon discovered the so-called circular points at infinity Brianchon (1806) extended the application of Desargues's theory of polars To Gergonne (1825–26) is due the principle of duality, the most important after that of continuity in modern geometry Gergonne was the first to use the word "class" and explicitly defined class and degree (order), showing their dual relation He and Chasles were the first to study scientifically surfaces of higher order Steiner (1832) gave the first complete discussion of the projective relations between ranges and pencils and laid the foundation for modern pure geometry In 1848 Steiner showed that the theory of polars can serve as a foundation for the study of plane curves, independent of the use of coordinates He introduced the noteworthy curves which now bear the names of himself, Hesse, and Cayley Chasles, in his *Aperçu historique* (1837), popularized the new geometry and introduced the name "homographic" and extended the homographic theory Von Staudt (1847, 1856–60) set forth a complete pure geometric system in which metric geometry finds no place Cremona (1862, 1875), Townsend (1863), and Clifford did much to extend the knowledge of modern geometry

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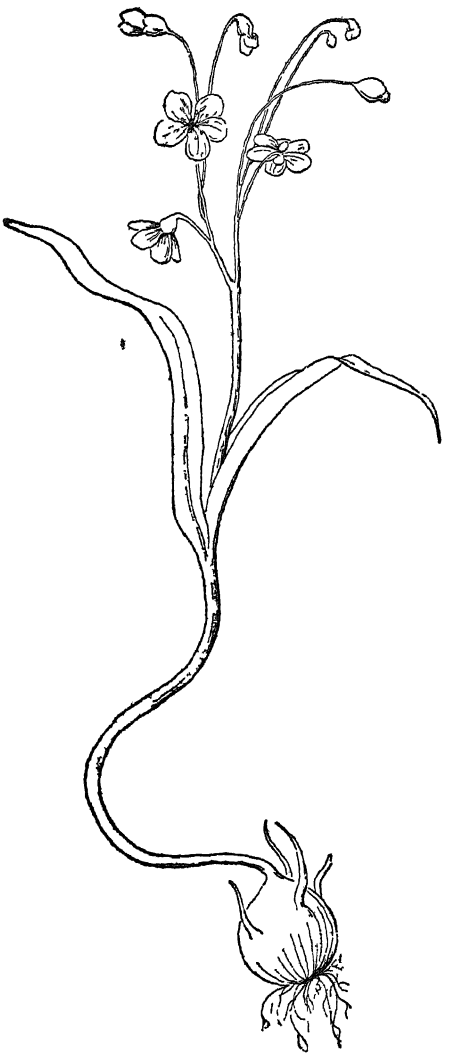
GEOPH'AGY (from Gk γῆ, *gē*, earth + φαγεῖν, *phagein*, to eat), or EARTH EATING The habit of eating clay or other earthy substances is widespread, having been noticed among the Indians of Bolivia and Peru, the Javanese, Persians, Hindus, Europeans, Africans, and certain inhabitants along the southern Appalachians in the United States This habit is susceptible of a number of explanations The Hopi Indians of Arizona, e g, prepare the small tubers of the wild potato (*Solanum jamesii*) for eating by mixing them with clay, the object being to reduce the acridity of the root The Dyaks take along with them in their canoes a supply of red ochre and oleaginous clay to eke out their rations, just as the Veddahs of Ceylon in time of famine eat decayed wood mixed with honey, in these cases the bulk of the food appeasing hunger by giving a sensation of fullness to the stomach

Other earth eaters allege that clay improves the complexion, it undoubtedly imparts the ghastly sallowness declaring a clay eater Deniker explains geophagy as perhaps due to the necessity of supplying the need of mineral substances which induces the eating of salt It is probable that in the majority of cases the habit is due to morbid or nervous conditions, such as cause biting of the finger nails, chewing slate pencils, etc The habit of geophagy is fatal, causing death by dysentery or dropsy

GEOPHILOUS (jē-ŏf'ĭ-lŭs) **PLANT** See GEOPHYTE

GE'OPHYTE (from Gk γῆ, *gē*, earth + φυτόν, *phyton*, plant) A plant whose perennial organs live under or close to the ground The term "geophilous" has been applied to such plants The majority of geophytes have two distinct life aspects, corresponding to the periods of greater and lesser physiological activity In the so-called growth period (summer in the higher latitudes,



GEOPHYTE

A spring beauty (*Claytonia*), showing the underground corm, the other (aerial) portions are present only a small part of the year

the rainy season in arid low latitudes), geophytes are conspicuous landscape features, by reason of aerial organs of various kinds, such as aerial stems, leaves, flowers, in the so-called resting period, however (winter in the higher latitudes, the dry season in arid low latitudes), they are inconspicuous by reason of the relative absence of aerial organs The most extreme geophytes are those whose organs are entirely beneath the soil during periods of lesser activity; examples of this class are bulbous plants (such as onions and lilies), plants with corms (such as Indian turnip and spring beauty), and rootstock plants (such as sweet flag and bracken fern) In the cases cited the entire plant is often hidden from ordinary view during the resting season One may also include in this category plants (like the carrot and dock) whose stems die down to the root at the close of a season of active growth, such plants usually have prominent roots The geophytic habit is also shown, though to a less extreme degree, by ordinary lawn grasses and by clover, in these and in similar plants the perennating organs are close to the soil rather than beneath it Biennials, such as mullein and evening primrose, have rosettes closely appressed to the soil in the winter or dry period, while in the growing period erect stems are sent up into the air In most geophytes reserve foods are stored in the underground parts, and in many cases these parts are greatly enlarged, ordinary bulbs, roots like turnips and beets, and potato tubers illustrate this habit The chief advantage of the geophytic habit in high latitudes is doubtless the attainment of protection from excessive cold and injuries consequent thereon, in arid regions protection from excessive transpiration is secured by a sojourn in the soil

GEOPON'ICI (a modern term, Lat in form, based on a (hypothetical) Gk form Γεωπονικοί, *Geoponikoi* denoting those who have to do with working the soil, from γῆ, *gē*, earth, and πόνος, *ponos*, toil) A Greek term for the Greek and Roman writers on agriculture, a similar Latin term is *Scriptores Rei Rusticæ* Among earlier Greek writers on agriculture may be mentioned Democritus, Aristotle, and Theophrastus, Xenophon praised Agriculture in his *Œconomicus* and in his *Memorabilia* Democritus' treatise, Περὶ Γεωργίας, *Peri Geōrgias*, was much used by later writers Many Greek writers of the Alexandrian period dealt with agriculture, their names appear in the works of Varro and Columella, named below (See also GEOPONIKA) For the Roman attitude towards agriculture, see AGRICULTURE, ROME Consult Cicero, *De Officiis*, i, 150–151, and Horace, *Carmina*, ii, 15, with the notes of the editors on these passages By order of the Senate the work of Mago the Carthaginian on agriculture was translated into Latin Cato the Censor wrote a work called *De Agricultura;* Varro wrote *Rerum Rusticarum Libri Tres* Vergil's *Georgics* ranks high in this field See HYGINUS, GAIUS JULIUS, COLUMELLA, PALLADIUS, RUTILIUS TAURUS ÆMILIANUS, AGRICULTURE Consult the edition of the Roman *Scriptores Rei Rusticæ* by J J Schneider (4 vols, Leipzig, 1794–97, 3d ed, 1819–21), and Magerstedt, *Bilder aus der romischen Landwirtschaft* (5 vols., Sonderhausen, 1858–62)

GE'OPON'IKA (Gk. γεωπονικά, nom pl neut. of γεωπονικός, *geōponikos*, relating to agriculture) A Greek treatise on agriculture It received its present form in the tenth century from an unknown hand, at the request of the Emperor Constantine VII (Porphyrogenitus), to whom it is dedicated The basis of this work was a compilation made in the sixth or early seventh century by a certain Scholasticus Cassianus Bassus, from the earlier works of Vindarius Anatolius, of Berytus, and Didymus, of the fourth or fifth century Recent researches tend to show that the ultimate source of the work is the Latin translation of a treatise on agriculture by the Carthaginian Mago; this translation was made by Cassius Dionysius, of Utica, in the first century B C. The names of some of the

earlier authors to whom reference is made are Africanus, Apuleius, Damogeron, Democritus, Diophanes, Florentinus, Leontinus, Pamphilus, Paxamus, the Quintilii, Varro, and Zoroastres The 20 parts into which the treatise is divided contain a mass of rules and directions bearing on the daily life of the husbandman Syrian, Arabian, and Armenian translations of this work are extant The best editions are by Niclas (Leipzig, 1781) and Beckh (ib, 1895) Consult Krumbacher, *Byzantinische Litteraturgeschichte* (Munich, 1897), pp 261 ff, and the works there referred to, Wellman, in *Hermes* (Berlin, 1908) See GEOPONICI

GEORGE I (GEORGE LOUIS) (1660–1727) The first Hanoverian King of Great Britain and Ireland (1714–27) He was the son of Ernest Augustus, first Elector of Hanover, and Sophia, granddaughter of James I of England, and was born at Hanover on March 28, 1660 Entering the army at the age of 15, he distinguished himself by his bravery His morals, however, were as loose as those of his contemporaries of equal rank, intrigues and mistresses made his marriage with his cousin, Sophia Dorothea, unfortunate. On the death of his father, in January, 1698, he became Elector of Hanover When his mother, at an advanced age, was declared heiress to the throne of England by the Act of Settlement of 1701 George drew near to Marlborough and the Whigs, on whom he relied for the support of his claim In 1705 he became Duke of Celle, and in 1706 his daughter was married to Frederick William of Prussia At the death of Queen Anne he succeeded to the crown without difficulty and reached England Sept 18, 1714 Unlike William III, who had aimed to reconcile opponents by calling men of both parties to the ministry, George, a far inferior man, employed Whigs only as advisers Utterly ignorant of English character and even of the language, and lacking sympathy with his new subjects, he aimed to exploit England for the benefit of his German electorate Another ground for his unpopularity was the greed of his favorites and mistresses, who sold offices, great and small George had little to do personally with the government, which was carried on by his ministers—at first by Stanhope and Townshend and later by Walpole The Jacobite insurrection of 1715 was easily suppressed, the leaders were put to death, and about 1000 rebels were transported to the plantations After this event George's frequent visits to Hanover made him still more unpopular, and even while he was in England he rarely attended the cabinet, as he could not understand the discussions For these reasons power came rapidly into the hands of Walpole During one of the absences (1720), the South Sea bubble burst, and the misfortune was naturally laid at the King's door, the company was alleged to have paid great bribes to the Duchess of Kendall, his favorite mistress Thereupon some advised George to abdicate in favor of the Prince of Wales, others urged him to seize absolute control of the government Without permitting him to resort to either expedient, Walpole, supported by Townshend, brought the government safely through the crisis Sometime afterward the demand of Spain for the restoration of Gibraltar and of Minorca (1725) led to a short war with that country Admiral Hosier commanded an unsuccessful expedition to the Spanish possessions in America (1726), but in 1727 peace was signed The King died of apoplexy on a journey to Hanover on June 11, 1727 He had two legitimate children—George, who succeeded him, and Sophia Dorothea Commonplace in ability as well as in personal appearance, George nevertheless gave England a wise foreign policy, and though he was by nature autocratic, the circumstances of his reign favored the growth of constitutional principles

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GEORGE II (GEORGE AUGUSTUS) (1683–1760) King of Great Britain and Ireland, Elector of Hanover (1727–60) The son of the preceding he was born at Herrenhausen, Hanover, Nov 10 (N S), 1683 After his mother s divorce in 1694, he lived with his grandparents, who superintended his education. On Sept 2, 1705, he married the Margrave of Anspach's daughter, Carolina Wilhelmina His code of morals was on a par with his father's, but his wife gained considerable influence over him by condoning his infidelities, and her death, in 1737, which was considered a national loss, he genuinely deplored In 1708 he joined Marlborough's army and showed conspicuous bravery at Oudenarde, where he narrowly escaped death At his father's accession to the throne he was created Prince of Wales Owing to his affection for his mother, he had never been on good terms with his father, who connived at a plot for his forcible disappearance. Their mutual repugnance increased when the King, during his visits to Hanover, was averse to appointing the Prince guardian of the realm The Prince supported the opposition party, but at his father's death, in 1727, was persuaded by the Queen to retain Walpole in power Walpole's administration was distinguished by the preservation of peace, and his unwillingness to declare war with Spain led to his resignation in 1742 He was succeeded by Carteret, who favored a war policy Anxious for the safety of Hanover, the King made an alliance with Maria Theresa of Austria in the Silesian Wars, and at Dettingen, in 1743, commanded the victorious army in person The Young Pretender's rebellion in 1745–46 was suppressed at Culloden by the Duke of Cumberland, the King's second son England joined Prussia in the Seven Years' War, which brought about the downfall of the colonial power of France. In 1757, by the victory of Plassey, Clive laid the foundations of the Indian Empire, and in 1759 Wolfe's victory on the heights above Quebec achieved the conquest of Canada In 1749 the funds rose above par, and Pelham effected an appreciable reduction of the national debt by reducing the interest from 4 to 3 per cent George II, although a mediocrity and possessed of an obstinate temper, was always sagacious enough to perceive the superior wisdom and prudence in the counsels offered by his ministers and acceded to their ad-

vice, to the material benefit and industrial progress of the country At the end of his reign Pitt conducted the affairs of the nation George II died suddenly from rupture of the heart, Oct 25, 1760, at Kensington Consult Hervey, *Memoirs of the Reign of George II* (London, 1854), Walpole, *Memoirs of the Last Ten Years of the Reign of George II* (ib, 1822, 1846), Schmucker, *History of the Four Georges* (New York, 1860), Thackeray, *Four Georges* (London, 1861), McCarthy *History of the Four Georges and William IV* (ib, 1884–1901), Jesse, *Memoirs of the Court of England from the Revolution of 1688 to the Death of George II* (ib, 1843), Coxe, *Memoirs of the Life and Administration of Sir Robert Walpole* (ib, 1798), id, *Memoirs of Horatio, Lord Walpole* (ib, 1802), Wilkins, *Caroline the Illustrious* (New York, 1904), Lucas, *George II and his Ministers* (London, 1910)

GEORGE III (George William Frederick) (1738–1820) King of Great Britain and Ireland (1760–1820) He was born on June 4, 1738, and succeeded his grandfather, George II. His father was Frederick Louis, Prince of Wales, and his mother was Augusta, daughter of the Duke of Saxe-Gotha His early education was the occasion of much quarreling between his father and grandfather and suffered in consequence After his father's death, in 1751, he was kept in seclusion and educated in a very narrow way by his mother and her favorite counselor, the Earl of Bute He learned to speak French and German, but knew little Latin and less Greek His English was poor in conversation and worse in writing He spelled badly and had no taste for literature Nevertheless, he began the famous collection of books and manuscripts which, under the name of King's Library, is one of the greatest treasures of the British Museum, and he had a genuine appreciation of music

George III had but average ability, but more than average obstinacy Although a great stickler for formalities and royal dignity, he was simple and economical in his tastes, which were emphatically those of the middle class He had a taste for farming and was fond of petty mechanical contrivances, and was often derisively called "Farmer George" and "the royal button maker" He was sincerely pious and, unlike his immediate predecessors and successors, was highly moral He married in 1761 the Princess Charlotte Sophia, daughter of the Duke of Mecklenburg, and became the father of 15 children He was a man of great courage and in moments of danger preserved the greatest dignity At the time of the Lord George Gordon riots his was the only clear head in the Council, and it was by his advice that the riots were suppressed

George III was perhaps the most important figure in the British constitutional development of the eighteenth century In his boyhood his mother had instilled exalted notions of the royal prerogative into his mind The Earl of Bute, too, emphasized these tendencies His plan was to do away with the party system as it then existed, and to resume the powers of the crown which had been appropriated by the cabinet ministry From the time of the accession of the house of Hanover the Whig oligarchy had controlled Parliament, and by their chosen ministers ruled the King George III designed to break up this oligarchy and to make himself the ruler. He differed from the Stuarts in that he proposed to rule constitutionally, with the consent of Parliament, and from the Pitts in that he wished to overthrow the oligarchy by exercise of the royal power, instead of appealing to public sentiment He reassumed the crown patronage which had passed into the hands of the cabinet and by it organized a group of politicians upon whom he could depend The "King's friends" thus became an important factor in politics He did not hesitate to use corruption to gain his ends, both in general elections and in securing parliamentary votes, according to the custom of his age Although at times the nation disapproved of his policy, yet in the main it supported his measures and the Whig oligarchy was finally broken

The history of the reign of George III is a description of the struggle he made to put his political theories into practice After the fall of Pitt, under whom England had entered upon a brilliant career of victory and conquest in the Seven Years' War, he succeeded in 1761 in introducing some of his own friends into the Whig ministry of Newcastle, and on the retirement of the latter in the following year he made Bute, his favorite, Prime Minister But there was great prejudice against Bute, on account of his Scottish nationality and well-known opinions on the royal prerogative He was not a man of sufficient ability to overcome this prejudice and, recognizing his failure, resigned in 1763 Meanwhile the Whig party had broken into three factions, and the King invited George Grenville, the leader of those whose opinions differed least from his own, to form a new cabinet He approved of the prosecution and exile of the Radical leader Wilkes by Grenville, and the Stamp Act (1765) taxing the American Colonies But being unable to tolerate Grenville's rudeness and dictatorial attitude, he dismissed him and reluctantly admitted the Rockingham ministry, which represented the most liberal of the Whig factions and the only English party that made no use of parliamentary corruption Their liberal measures, notably the repeal of the Stamp Act, displeased the King, and in 1766 he invited Pitt, whom he made Earl of Chatham, to form a cabinet Pitt's cabinet was formed, but the King's plans were frustrated by the failure of the Prime Minister's health During the ministry of Grafton that followed, the King approved of Townshend's duties levied in 1767 on certain goods imported into the American Colonies and also of the exclusion of Wilkes from the House of Commons, although the attitude of the House was in opposition to the best political and legal thought of the day On the resignation of Grafton he at last found in Lord North a minister after his own heart North honestly agreed with the King's ideas and tried to carry them out He was firm and able, seldom gave offense, and had great tact for managing parliamentary majorities During his long ministry (1770–82) the King virtually directed political affairs, as his correspondence with Lord North shows (ed by W B Donne, London, 1867) Throughout the American War, of which he was strongly in favor, his wishes controlled the ministry, the Commons being a mere instrument in his hands After the French-American alliance he alone wished to continue the war, refusing to allow Lord North to resign When at last the inevitable resignation came, he contrived to break up the second Rockingham ministry, through the influence of Shelburne On the downfall of the

Shelburne ministry he defeated by his personal efforts the combination ministry of Fox and North In the face of a hostile majority he appointed the younger Pitt as Prime Minister, and the electors signified their approval by returning a Tory majority to Parliament

Although Pitt was by no means subservient, there was no friction between him and the King, who approved most of his measures George was strongly in favor of the long and ruinous war with France, and of the union which Pitt forced upon Ireland in 1801 He was opposed, however, to Pitt's attempted parliamentary reform in 1785 and to the impeachment of Warren Hastings, which measures were, after all, defeated He refused to allow the cabinet to appoint the bishops, as had become the custom, and in the case of Archbishop Sutton of Canterbury took the appointment directly out of Pitt's hands He refused positively to grant Catholic emancipation, which he conceived to be contrary to his coronation oath, and in 1801 forced Pitt to resign rather than allow his promise of emancipation to the Irish Catholics to be fulfilled In 1804 he dismissed the entire Addington ministry because its members refused to pledge themselves never during his life to advocate Catholic emancipation His dislike of Fox, who he supposed had a bad influence on the Prince of Wales, is well known He repeatedly refused to allow him to enter the ministry (1781, 1782, 1803, 1804, 1806), "even at the hazard of a civil war" This dislike he lived to overcome, and he much regretted the death of Fox

The King's last years were darkened by many troubles, keenest of which was the conduct of his brothers and of his children, particularly the Prince of Wales, whose immoral and undutiful behavior embittered his life He had to bear the brunt of popular ill feeling occasioned by the economic misery the French War brought to England He was also afflicted by sickness In 1805 he had trouble with his eyes, and by 1809 he became blind. As early as 1765 he was mentally deranged for a short time In 1788 there was a recurrence of the same trouble, and the first Regency Bill was passed, but he speedily recovered In 1811, soon after the death of his favorite daughter, Amelia, he finally became hopelessly insane, and his son (afterward George IV) acted as Regent until the King's death, on Jan 29, 1820

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GEORGE IV (GEORGE AUGUSTUS FREDERICK) (1762–1830) King of Great Britain and Ireland (1820–30) The eldest son of George III, he was born in St James's Palace, Aug 12, 1762, and was created Prince of Wales five days afterward He was well educated and strictly disciplined, but displayed an ungovernable temper, and on attaining his majority became notorious for his profligacy and extravagance He contracted a marriage with Mrs Fitzherbert, Dec 15, 1785, but in 1787, to obtain parliamentary assistance for his debts, he allowed Fox to deny the marriage in Parliament On April 8, 1795, again to liquidate his debts, he married his cousin, Caroline Amelia Elizabeth, of Brunswick (q v) They had one daughter, the Princess Charlotte Augusta, born Jan 7, 1796, who married Prince Leopold, afterward King of Belgium, but died in childbed, Nov 6, 1817 George deliberately deserted his wife shortly after his daughter's birth, and his conduct towards her, his attempts to procure a divorce, his numerous mistresses, and general behavior, made him extremely unpopular, notwithstanding his cleverness, versatility, and gracious manner, which among a certain class of associates earned him the title of "the first gentleman in Europe" From a spirit of antagonism he supported the Whig opposition, and his father's insanity was partly due to his misconduct He became Prince Regent in 1811, and King at his father's death, on Jan 29, 1820 The Napoleonic wars, the War of 1812–15 with the United States, the aid rendered to the Greeks by the British fleet in the battle of Navarino (1827), which secured the independence of Greece, and the passing of the Roman Catholic Emancipation Bill (1829), are the notable events of his reign He died at Windsor, June 26, 1830 Consult McCarthy, *History of the Four Georges and of William IV* (4 vols, London, 1884–1901), Thackeray, *Four Georges* (ib, 1861), Lady Bury, *Diary of the Times of George IV* (ib, 1838), Croly, *Life of George IV* (ib, 1830), Huish, *Memoirs of George IV* (ib, 1830), Holland, *Memoirs of the Whig Party* (ib, 1854), Fitzgerald, *Life of George IV* (ib, 1881) Melville, *The First Gentleman of Europe* (ib, 1906), Wilkins, *Mrs Fitzherbert and George IV* (ib, 1908).

GEORGE V (GEORGE FREDERICK ERNEST ALBERT) (1865–) King of Great Britain and Ireland and of the Dominions beyond the Seas and Emperor of India The second son of Edward VII, he was born at Marlborough House, London He entered the navy in 1877, studied at Greenwich, and became lieutenant in 1885 and captain in 1893, rear admiral in 1901 and vice admiral in 1903 After the death of his elder brother, Albert Victor, Duke of Clarence, in 1892, he was made Duke of York. In 1893 he married Princess Victoria Mary of Teck, who had previously been engaged to his brother Albert Victor She bore him five sons and a daughter· Edward, Prince of Wales (1894), the princes Albert (1895), Henry (1900), George (1902), and John (1905); and Princess Mary (1897). Upon the accession of Edward VII

(1901) he received the title of Duke of Cornwall, made a journey around the world, in the course of which he visited all the great British colonies, and on his return in November was created Prince of Wales In 1905–06 he made a tour of India On the death of his father, in 1910, he succeeded to the throne as George V, his wife taking the style of Queen Mary They were crowned June 22, 1911, in Westminster Abbey, visited India and held a durbar on Dec 12, 1911, and in February, 1912, returned to England The charge made in a "republican" paper, the *Liberator*, by Edward Mylius that in 1890, before he became Duke of York, King George had married secretly in Malta a daughter of Sir Michael Culme-Seymour was disproved in 1911 in a trial for libel, in which the King wished to take the witness stand Although the new court soon showed itself stricter and more old-fashioned than King Edward's had been, King George had become popular as the "Sailor Prince," who as early as 1901 had made a vigorous speech from the text "Wake up, England" Even the heroic measures by which the Parliament Bill of 1911 was forced through under threat that the King would create peers to give effect "to the decision of the country" did not affect the popularity of the crown Consult Robert Hudson, *Our Sailor King* (London, 1911), H F Burke, *Historical Record of the Coronation* (ib, 1912), J W. Fortescue, *Narrative of the Visit to India of their Majesties, King George and Queen Mary* (ib, 1912) See WAR IN EUROPE

GEORGE I (1845–1913) King of Greece from 1863 to his death in 1913 He was the second son of King Christian IX of Denmark and served for some time in the Danish navy After the deposition of King Otto in 1862, the National Parliament in the following year conferred the crown on Prince William of Denmark, as George was then called, who, with the concurrence of his own family and the consent of the Great Powers, ascended the throne of Greece as George I He was married at St Petersburg to Princess Olga, daughter of Grand Duke Constantine, Oct 27, 1867 He consistently pursued a Panhellenic attitude, as shown especially in the war with Turkey (1897) After carrying on a war with his ancient enemies, the Turks, to a successful conclusion (1911–13), King George I was assassinated at Salonika, March 19, 1913 See GREECE, BALKAN WAR

GEORGE V (1819–78) The last King of Hanover He was the son of Ernst August (q v), and grandson of George III of England When he ascended the throne in 1851, on the death of his father, he was afflicted with blindness As a result, he fell into the hands of unwise and unscrupulous advisers He was a bitter foe to Prussia and joined Austria against her in 1866 After Austria's defeat Hanover became a part of Prussia, and King George went to Vienna and then to Paris, where he continued to agitate against Prussia In 1868 he relinquished his claims to Hanover for the sum of 16,000,000 thalers, but his enmity to Prussia declared itself so strongly that the sum was not paid, but was held by the government as the "Guelph Fund" (q v)

GEORGE (1832–1904), King of Saxony He was the youngest son of King John (1801–73), entered the army in 1846, studied at Bonn in 1849–50, fought in the War of 1866 against Prussia, and was corps commander in the Franco-German War He succeeded his brother Albert June 19, 1902, and died Oct 15, 1904 His eldest son, Frederick Augustus, followed him on the throne

GEORGE II (1826–1914) Duke of Saxe-Meiningen and Hildburghausen, born at Meiningen, a son of Duke Bernhard II He was educated at Bonn and Leipzig, and succeeded upon the resignation of his father in 1866 He was a patron of the drama and advanced histrionic art by organizing, with the assistance of his intendant and manager, Ludwig Chronegk, a troupe of actors who played in Europe and America He married in 1850 Charlotte, Princess of Prussia, who died in 1855, in 1858, Feodore of Hohenlohe-Langenburg, who died in 1872, and in 1873, morganatically, Helene Franz, who received the title of Baroness von Heldburg His son Prince Frederick was killed at the siege of Namur, Aug 23, 1914

GEORGE (1653–1708) Prince of Denmark and husband of Queen Anne of England He was the son of Frederick III of Denmark By Anne, whom he married in 1683, he had 17 children, all of whom died before their mother became Queen of England Prince George was devoid of talent and ambition, but was brave and humane Through his wife's influence he deserted James II in the hour of need After the triumph of the Prince of Orange, Prince George was naturalized and created Duke of Cumberland He was present at the battle of the Boyne, and when his wife ascended the throne he was created Lord High Admiral

GEORGE, called THE BEARDED (1471–1539). Duke of Saxony He was the eldest son of Albert the Brave, founder of the Albertine line of dukes He received a theological education at Meissen and Leipzig and succeeded his father in 1500 He was a son-in-law of King Kasimir of Poland He was a good ruler, kindly and accessible to his subjects Though he agreed with Luther as to the need of reform in the Church, the Duke did not acquiesce in the change in dogma advanced by him, and he soon became an ardent opponent of the Reformation, especially after the famous debate between Luther and Eck at Leipzig in 1519 Consult Welck, *George der Bartige* (Brunswick, 1900)

GEORGE, called PISIDA, "the Pisidian." A prominent churchman and historical and religious writer of Constantinople in the seventh century. He held various offices in the "Great Church" (of St Sophia) and is thought to have accompanied the Emperor Heraclius on his expedition against the Persians (622 A D.). He was the author of many poems of an historical or religious character, in which he celebrated the wars of Heraclius and discussed the theological questions of the day, these are to be found in Migne, *Patrologia Græca*, vol xcii (Paris, 1854–66) Consult Sternbach, in *Wiener Studien*, vols xiii–xiv (Vienna, 1891–92), id, *De Georgii Pisidæ apud Theophanem aliosque Historicos Reliquiis* (Cracow, 1899).

GEORGE, DAVID See DAVIDISTS, JORIS, DAVID

GEORGE, FREDERICK WILLIAM ERNEST (1826–1902) Prince of Prussia, general, and author. He entered the Prussian army in 1836, was advanced to the rank of lieutenant general in 1860, and subsequently became general of cavalry (1866). Of his numerous dramatic works, published under the name of G Conrad, several have been publicly performed and are still some-

times played They include *Wo liegt das Gluck?* (1877), *Don Sylvio* (1877), *Elektra* (1877), *Yolanthe* (1877), *Medea* (1877), *Sappho* (1887) Some of these were collected in four volumes (1870) He also wrote on economics and politics Consult the sketch by Von Olfers in vol vi of the *Hohenzollern-Jahrbuch* (Leipzig, 1903)

GEORGE, GRACE (1880–). An American actress She was born in New York City, where she made her debut in *The New Boy* in 1894 She first starred in *The Princess Chiffon* (1899) and afterward in *Her Majesty* (1900); *Under Southern Skies* (1901–02), *Frou-Frou* (1903), *Pretty Peggie* (1903–04), *The Two Orphans* (1904) She made a great success in the rôle of Cyprienne in *Divorçons* in both New York and London in 1907, and she reappeared in the same play in 1913 She also played in *Sylvia of the Letters* (1909), *A Woman's Way* (1909), *Just to Get Married* (1911–12), *The Earth* (1912), Barrie's *Half an Hour* (1913); and a revival of Clyde Fitch's *The Truth* (1914). Consult William Winter, *The Wallet of Time* (2 vols, New York, 1913)

GEORGE, HENRY (1839–97). An American economist, born in Philadelphia, Pa When 14 years old, he was forced to leave school and to seek work in order to support himself After shipping as foremast boy on a vessel bound for Melbourne and Calcutta, he learned the printer's trade and in 1858 worked his way to California. At this time the excitement attending the discovery of gold in Fraser River, British Columbia, was at its height, and Henry George worked his way to Victoria on a sailing vessel After enduring many privations he returned to San Francisco, where he found work in a printing office As the business of the printing office grew slack, he secured a position in a rice mill. For the next few years he drifted from one employment to another, always in financial straits, due to no lack of energy on his own part In 1861, in company with five other printers, he undertook to publish a daily newspaper, the *Evening Journal*, but this venture also proved unsuccessful. In 1865 he began to write for the press He was soon engaged as a reporter on the San Francisco *Times*, where he was quickly promoted to the position of chief of staff In 1866 he wrote a letter to the New York *Tribune* attacking the Central Pacific Railroad and the Wells, Fargo Express on the ground of their monopolistic extortions In 1869 he wrote for the same paper a letter on the Chinese question, which gained the warm commendation of John Stuart Mill The great fortunes acquired in California through the rapid increase in the value of land fixed his attention upon the land problem, and in a pamphlet published in 1871, entitled *Our Land Policy*, he advanced most of the ideas that later appeared in *Progress and Poverty*—that the value of land represents in the main a monopoly power, and that the entire burden of taxation should be levied upon it, thus freeing industry from taxation and equalizing opportunities by destroying monopoly advantage

Progress and Poverty, George's most important work, was first published in 1879. At first it attracted little attention and found few buyers, but in a few years it attained extraordinary popularity, especially in England, where the Irish land problem was the burning question of the day. Interest in the book increased at home, and by 1883 Mr George found himself regarded as the apostle of a new social creed From this time his activities were engaged chiefly in lecturing both in America and in the United Kingdom and in writing articles for papers and magazines on the land question and on other economic and political subjects His literary activities brought him but little pecuniary return, and he remained in straitened circumstances until the end of his life In 1886 George became a candidate for the mayoralty of New York City, but was defeated by Abram S Hewitt. In 1897 he again ran for mayor, but died before election day

The chief contributions of Henry George to economic science are to be found in *Progress and Poverty* *The Science of Political Economy*, published after his death, contains little that is of value The main theses of *Progress and Poverty*, that economic progress is marked by increasing extremes of wealth and poverty, resulting from the tendency of rent to absorb all values above minimum wages and interest, and that the confiscation of rent through a single tax on land would restore democratic equality and universal prosperity, have not received acceptance from scientific writers But the theory of wages which he advanced in opposition to the prevailing "Wages Fund Doctrine"—that the laborer is paid, not out of capital, but out of the value which he himself creates—has been adopted by some of the most important economists of the day See SINGLE TAX, and consult George, *The Life of Henry George* (New York, 1905)

GEORGE, JAMES ZACHARIAH (1826–97) An American legislator, born in Monroe Co, Ga After serving in the regiment known as the Mississippi Rifles during the Mexican War, he devoted himself to the study of law Soon after the secession convention in Mississippi he enlisted in the Confederate army and eventually rose to the rank of brigadier general As chairman of the executive committee of the Democratic party in 1875 he was a conspicuous factor in the political agitation of that period He was appointed Chief Justice of Mississippi in 1879 and was a member of the United States Senate from 1881 until his death He was distinguished alike as jurist and statesman and during his career in the Senate displayed exceptional oratorical ability and unusual power of logical reasoning He was probably the most influential member of the State Constitutional Convention of 1890 He published *Reports* of the Mississippi Supreme Court for 1856–60 and a *Digest* of the same court for 1818–72 The infirmary of the State Agricultural and Mechanical College bears his name

GEORGE, LAKE A lake in eastern New York, lying in Warren, Washington, and Essex counties, near the border of Vermont (Map· New York, G 3) It is about 33 miles long from south to north, and from about ¾ to about 3 miles wide, generally shallow, but in some places very deep It is connected with Lake Champlain on the north Lake George is one of the most beautiful of the lakes of the United States Its waters are singularly clear, it is dotted with charming islands, and the surrounding scenery, with the closely encompassing foothills of the Adirondack Mountains rising to a maximum altitude of 2665 feet (Black Mountain, near the eastern shore), is most picturesque. Great historical interest attaches to it in events connected with the French and Indian

War and the War of the Revolution, especially the battle of Lake George (1755), which is commemorated by a monument in the Fort George Battle Park, of 35 acres, a State reservation The lake was discovered in 1642 by the Jesuit Father Jogues and was named by him Lac Saint-Sacrement In 1775 it was given its present name in honor of King George III Consult "Lake George" in *Harper's Magazine*, vol lix (1879), for a description of the scenery about the lake and its historical associations, also, Reid, *Lake George and Lake Champlain* (New York, 1910)

GEORGE, SAINT (?–303). The patron saint of England Little is known of his life, the reports concerning him being largely legendary Although frequently confounded (as, e g, by Gibbon) with George of Cappadocia, the Arian leader, he lived at an earlier period than the latter He is said to have been a person of consequence, born at Lydda or at Ramleh, Palestine, and educated in Cappadocia, who embraced Christianity, attained high rank under Diocletian, and suffered martyrdom in Nicomedia in April, 303. His festival (Roman) is April 23 He was extremely popular with the English Crusaders and was adopted as the tutelary saint of England during the reign of Edward III, although the Council of Oxford in 1222 had decreed that his feast should be a national one He is also the patron of Russia and Portugal Churches and religious establishments have borne his name from the earliest times He is venerated not only by the Western and Eastern churches, but also by the Mohammedans as Ghergis, or El Khouder The red cross of Saint George on a white ground was long worn as a badge by the English soldiery and is now displayed on the Union Jack The story of the combat between St George and the Dragon first appears in the Middle Ages in the *Legenda Aurea* of Jacobus de Voragine, it may owe something to the fact that Lydda was near the scene of Perseus' rescue of Andromeda, or to an allegorization of Diocletian as a dragon Consult Budge, *The Martyrdom and Miracles of St George* (London, 1888), Coptic texts and versions, Flemming, *St George of England* (New York, 1901), Huber, *Zur Georgslegende* (Erlangen, 1906), Gordon, *Saint George* (London, 1907), Bulley, *St George in Merrie England* (ib, 1908), and, of utmost importance, Delehaye, *Les légendes grecques des saintes militaires* (Paris, 1909)

GEORGE, WILLIAM REUBEN (1866–). An American, known as the founder of the George Junior Republic He was born at West Dryden, N Y, was educated in the public schools, and moved to New York City in 1880, where he engaged in business In 1890–94 he took large parties of boys and girls to spend vacations with him In 1894 he instituted the plan of requiring the children to work for what they received and also introduced self-government among them, and in the following year this plan was developed into the "George Junior Republic," at Freeville, N Y For a consideration of the further relations of Mr George to the Republic, see GEORGE JUNIOR REPUBLIC.

GEORGE-A-GREENE, THE PINNER OF WAKEFIELD. A comedy (1595), ascribed to Robert Greene on the evidence of certain obscure and contradictory manuscript notes on the title-page of a copy now in possession of the Duke of Devonshire At any rate, the reputed author acted the part of the Pinner The sources are an early prose romance entitled *The History of George-a-Greene* and a ballad called *The Jolly Pinder of Wakefield with Robin Hood, Scarlet, and John*

GEORGE BARN'WELL, OR, THE LONDON MERCHANT A bourgeois tragedy in prose, by George Lillo, produced at Drury Lane, June 22, 1731 Consult Cibber's *Life of Lillo*

GEORGE ELIOT The pseudonym of Mary Ann Evans, the English novelist See ELIOT, GEORGE

GEORGE FREDERICK, PRINCE OF WALDECK A German soldier See WALDECK, GEORG FRIEDRICH

GEORGE JUNIOR REPUBLIC A community of boys and girls near Freeville, N Y, about 9 miles east of Ithaca It was founded in 1895 by William R George, of New York, for the purpose of affording neglected, reckless, and unfortunate children an opportunity to acquire the qualities necessary for their future welfare in life, and was the outcome of an experiment which Mr George had been conducting for some years by taking every summer from 150 to 250 children of the slums to spend their vacation with him at his country home

The constitution of the miniature republic is modeled upon that of the United States, with elective officers, a legislature (first a town meeting and later two branches), a judicial system, and administrative machinery At first Mr George was president, with adults in the higher offices, but since 1896 the boys have filled all offices Each citizen was obliged to work or starve, he could work for Mr George for six hours a day, or for citizen contractors, who purchased licenses for the different kinds of business from Mr George, or in the school Nothing could be obtained in the community except by purchase in the citizens' own tin coin (now aluminium), which at the end of the summer was redeemed in United States money, or supplies to take home. In the first year a number of practical questions were met by the youthful legislators a depreciated currency, a tariff question, woman's suffrage, and a trust among hotel proprietors Much criticism has been directed against the republic from the beginning on account of the great latitude granted to its immature citizens in enacting and administering the laws In particular it has been charged that excessively long prison sentences are imposed, and the New York charitable authorities have insisted that the constitution be modified so as to place penal authority in the hands of adults Mr George and his disciples insist that any curtailment of responsibility must inevitably reduce the educational value of the institution

The original purpose of the institution was to provide for the rehabilitation of boys and girls who had fallen into delinquency through the influence of an unwholesome environment Later Mr George concluded that life in the community would be good for other youths as well Some children of well-to-do parents have been placed in the institution simply to secure the benefits of its wholesome training in independence The republic does not admit defectives knowingly In some instances mental defectives have been harbored in the republic, to its injury, and without benefit to themselves Children from any part of the United States may be consigned to the guardianship of the trustees by parents or public authorities The age of admission is 12 to 18 years. The repub-

lic has a number of buildings, with simple accommodations which are used for school, government purposes, workshops, hotels, restaurants, store, bank, and library The kinds of work carried on under efficient directors are farming (the trustees own or control a little over 300 acres), carpentry (the boys put up new buildings), printing, dressmaking, scientific cooking, domestic service, bread and wafer baking, furniture manufacture, and plumbing The institution also operates a laundry All children under 16 must attend the republic's primary and grammar school

The success of the George Junior Republic soon attracted attention throughout the country In 1897 Mrs William T Carter, after a visit to the republic, established a similar institution at Reddington, Pa, known as the William T Carter Junior Republic. In 1899 citizens of Washington and Baltimore established the National Junior Republic at Annapolis Junction, Md In 1904 the Connecticut Junior Republic was organized at Litchfield, Conn These organizations, although in close communication with the George Junior Republic, were entirely independent of it In 1908 representatives from these republics met at the invitation of Mr George and founded the National Association of Junior Republics, of which Mr George was made director The object of the association is to correlate the activities of the several organizations and to work towards the establishment of new organizations After the formation of the association junior republics in affiliation with it were established at Chino, Cal, Flemington, N J, Grove City, Pa, Moorestown, N J, and Dorset, England After the extension of the Junior Republic movement to other towns and the formation of the National Association of Junior Republics the connection of Mr. George with the Junior Republic at Freeville became essentially that of unofficial adviser. In 1913 serious criticisms of his methods of conducting the Republic were brought by the State Board of Charities, and a committee of investigation, with *personnel* accepted by both George and his critics, while absolving the institution's founder of the charge of personal wrongdoing, censured severely certain of his methods in dealing with citizens of the Republic suspected of delinquency. In 1914 the recurring deficits in the Republic budget led to a decision on the part of the trustees to close the institution An offer of Mr George to take the institution under his charge was accepted

Bibliography *American Journal of Sociology*, iii, *Annals of American Academy of Political and Social Science*, x, 73, *Nothing without Labor*, report of G J. R. Association (July, 1899); *Address to Twenty-eighth National Conference of Charities and Correction* (1901); George, *The Junior Republic* (New York, 1909); George and Stowe, *Citizens Made and Remade* (ib, 1912); *The Citizen*, a monthly publication of the George Junior Republic; Annual Reports of the National Association (1908–)

GEORGE OF CAP'PADO'CIA. Arian Archbishop of Alexandria, 356–361. He was a native of Epiphania, in Cilicia, yet he is always called a Cappadocian, though such only by ancestry Our knowledge of him comes from his adversaries, who load his early life with slanders He seems to have lived for some time at Constantinople It is not known when or how he obtained ecclesiastical orders, but in 356 he turns up as Bishop of Alexandria after the banishment of Athanasius He had the support of the Arian faction and the Emperor Constans His cruelty and oppression were such that a rebellion broke out, and he had to flee for his life He was restored by a military demonstration, but did not mend his ways A few days after the accession of Julian the populace arose en masse, dragged him out of prison, where he had been placed by the magistrates for safety, paraded him with every indignity through the streets on a camel, burned his dead body, and cast the ashes into the sea He is represented as ignorant not only of the Scriptures and theology, but even of letters Yet it is said he owned a fine library which Julian had preserved for his own use He is not to be confused, as Gibbon has done, with St George, the patron of England

GEORGE OF TREB'IZOND (c 1396–1484). A scholar famous in connection with the revival of the study of Greek in Italy He was born in the isle of Crete, but was descended from a family of Trebizond A noble Venetian, Francesco Barbaro, invited him to Venice, where he became professor of rhetoric and philosophy As secretary to Pope Eugenius IV and later to Pope Nicholas V, he occupied a conspicuous position at Rome as a Greek scholar and as a translator of Greek authors into Latin The inaccurate character of his work provoked the criticism of contemporary scholars, especially of Cardinal Bessarion He was an ardent advocate of the Aristotelian system of philosophy and engaged in controversy with his contemporary, the Platonic philosopher, Gemistus Plethon Among his writings are *Rhetorica* (1470) and *Comparationes Philosophorum Platonis et Aristotelis* (1523) Consult Fabricius, *Bibliotheca Græca*, ed by Starles, vol xii (Hamburg, 1790–1809), and Voigt, *Die Wiederbelebung des Classischen Altertums* (2d ed, 2 vols, Berlin, 1893)

GEORGES, zhôrzh, MARGUERITE JOSÉPHINE WEIMAR, known as Mademoiselle Georges (1787–1867) A French tragic actress of great beauty and talent, born at Bayeux When she appeared at the Théâtre Français in 1802 as Clytemnestra, she made an unusual sensation In 1808 she suddenly deserted her position and went to Russia She played before Napoleon at Dresden in 1812, however, and in 1813, under the patronage of Hortense, was allowed to return to the Comédie Française, but left that stage definitely in 1816 Talma was one of her teachers She devoted herself upon the stage to the Romantic movement led by Victor Hugo and the elder Dumas, and in their works won some of her greatest triumphs Among her famous rôles were Dido, Semiramis, Lucrezia Borgia, and Marie Tudor She left the stage in 1849 Her later years of retirement were unhappy, largely through the caprices that had marred her career and the comparative poverty which ensued

GEORGE SAND, *Fr. pron.* zhôrzh saND See SAND, GEORGE

GEORGE'S CHANNEL. See ST. GEORGE'S CHANNEL.

GEORGES DANDIN, zhôrzh daN'dăN'. The title of a comedy by Molière (1668).

GEORGE'TOWN. The capital of British Guiana, situated on the right bank of the river Demerara, 1 mile from its mouth (Map· America, S, D 2). It is well built, and its streets are regular and well shaded by trees.

The houses are generally of wood Some of the streets are traversed by canals Among the public buildings may be mentioned the Anglican and Roman Catholic cathedrals, the museum, with its library, the Colonial Hospital, orphan asylum, Queen's College, teachers' seminary, seamen's home, etc There are also botanical gardens, schools, theatres, barracks, electric lights, electric street railways, and telephone service Georgetown is connected by rail with Mahaica and Rosignol Along the banks of the river extends the Ring, a promenade sheltered with cabbage palms The city is supplied with water from artesian wells The harbor provides good anchorage and has a mole and fortifications The climate is hot but not particularly unhealthful, mean annual temperature, 80° F, mean annual rainfall, 92 inches The commerce is considerable, the chief exports being sugar, gold, rum, and balata The population is about 54,000, of whom only about one-tenth are whites

GEORGETOWN A city of the British Straits Settlements See PENANG

GEORGETOWN. A railway junction in Halton Co, Ontario, Canada, 29 miles west of Toronto, on the Grand Trunk Railroad (Map Ontario, E 6) Its manufactures include paper, knitting machines, boots and shoes, lumber, gloves, acetylene-gas machines, and carriages Pop, 1901, 1313, 1911, 1583

GEORGETOWN A seaport town and the county seat of King's Co, Prince Edward Island, Canada, situated on a peninsula formed by the Cardigan and Brudenell rivers, 39 miles east of Charlottetown by rail (Map New Brunswick) and on the Prince Edward Island Railway Georgetown has steamboat communication with various ports and carries on a considerable trade in agricultural produce There is a lobster-packing industry A United States consular agent is resident here Pop, 1914 (local est), 1010

GEORGETOWN A town and the county seat of Clear Creek Co, Colo, 50 miles west of Denver, on the Colorado and Southern Railroad (Map Colorado, D 2) It has important gold, silver, lead, zinc, and copper mining interests, and is popular as a summer resort because of its picturesque location and healthful climate. The town contains a public library, hospital, and a fine park The water works are owned by the municipality Pop, 1900, 1418, 1910, 1950

GEORGETOWN A town and the county seat of Sussex Co, Del, 40 miles south by east of Dover, on the Pennsylvania Railroad (Map Delaware, J 3) It is in an agricultural region and has canning interests Pop, 1900, 1658, 1910, 1609

GEORGETOWN Formerly a town in the District of Columbia, now included within the limits of Washington (q v)

GEORGETOWN A city and the county seat of Scott Co, Ky, 12 miles north of Lexington, on the Queen and Crescent, the Frankfort and Cincinnati, and the Southern railroads (Map Kentucky, F 3) It is primarily a residential place and is the seat of Georgetown College (Baptist), established in 1829 The city is in an agricultural and stock-raising region, and has brickworks, flouring mills, and a large oil-refining plant The Royal Spring, rising in the centre of the city and flowing 200,000 gallons per hour, supplies the city with water and furnishes power for an ice plant, flour mill, and other industrial establishments Settled in 1776. Georgetown was first incorporated in 1790 and was chartered as a city of the fourth class in 1894 The government is administered by a mayor, chosen every four years, and a unicameral council, elected on a general ticket Pop, 1900, 3823, 1910, 4533

GEORGETOWN A village and the county seat of Brown Co, Ohio, 42 miles east by south of Cincinnati, on the Cincinnati, Georgetown, and Portsmouth, and the Ohio River and Columbus railroads (Map Ohio, C 8) The village contains a children's home It is the centre and distributing point of a tobacco-growing district and has some manufactures Limestone is quarried in the vicinity The electric plant is operated by the town Pop, 1900, 1529, 1910, 1580

GEORGETOWN. A city, port of entry, and the county seat of Georgetown Co, S C, at the head of Winyah Bay, 60 miles by rail northeast of Charleston, on the Georgetown and Western Railroad (Map South Carolina, E 3) It is a seaport of some importance, the market for a fertile agricultural region traversed by 1000 miles of navigable rivers that empty into the bay, has steamship communication with New York, Charleston, and Baltimore, and exports rice, cotton, turpentine, shingles, lumber, fish, grain, alcohol, etc The manufacturing establishments include machine shops and foundries, bottling works, chemical and canning factories, saw mills, and an alcohol factory Georgetown, settled about 1700 and incorporated in 1805, is famous as the landing place of Lafayette on his first visit to the United States It contains a public library and fine custom house and post-office buildings The government is administered under a charter of 1892, which provides for a mayor chosen biennially and a council elected at large The water works are owned by the city Pop, 1900, 4138, 1910, 5530

GEORGETOWN A city and the county seat of Williamson Co, Tex, 28 miles by rail north of Austin, on the San Gabriel River, and on the International and Great Northern and the Missouri, Kansas, and Texas railroads (Map Texas, D 4) It is in an agricultural and stock-raising region and has cotton gins, a cotton-seed-oil mill, and planing mills The city is the seat of Southwestern University (Methodist Episcopal, South), founded in 1873 In Page Park are mineral wells, which analysis shows to be similar to the famous Karlsbad Springs Settled in 1848, Georgetown was incorporated 18 years later and is governed under revised statutes of 1895 by a mayor and council elected biennially on a general ticket The water works and electric-light plant are owned by the city Pop, 1900, 2790, 1910, 3096

GEORGETOWN INDIANS See SALISHAN STOCK

GEORGETOWN UNIVERSITY An institution of higher education, situated at Georgetown, D C It was founded in 1789 by members of the Roman Catholic church and was in 1805 transferred to the Society of Jesus in Maryland in whose control it remains By a congressional Act of 1815 the university was empowered to grant academic degrees, and in 1833 the holy see authorized it to confer degrees, in the name of the church, in philosophy and theology. The university consists of the college; the school of medicine, organized in 1851 and including a school of dentistry, and the school of law, organized in 1870 The college comprises the graduate school, organized in 1856, the under-

graduate department, and the astronomical observatory, established in 1842 The scheme of instruction is, in general, conducted in accordance with the famous *Ratio Studiorum* of the Jesuits The supervision of students is no closer than in most colleges of equal standing, and the standard of scholarship is very high Degrees are conferred in arts, philosophy, medicine, dentistry, and law In 1914 the faculty numbered 177, and the student enrollment was 1567. The income (1914) was about $260,000 The president in 1914 was Very Rev A J Donlon, S J Consult J S Easby-Smith, *History of Georgetown University* (2 vols, New York, 1908)

GEORGE WASHINGTON UNIVERSITY An institution of higher learning, situated at Washington, D C Founded in 1821 by members of the Baptist church, it was known as Columbian College until 1873, when, following a gift by W W Corcoran with this end in view, the college and professional schools were incorporated as Columbian University In 1904 this and other educational institutions were merged under the name of George Washington University, thus carrying out the wish of George Washington that a national university be founded at Washington

The departments and colleges are grouped as follows (1) Department of Arts and Sciences (*a*) School of Graduate Studies, (*b*) Columbian College, (*c*) College of Engineering and Mechanic Arts, (*d*) Teachers College, (2) Department of Law, (3) Department of Medicine; (4) Department of Dentistry, (5) Associate Colleges, having independent financial foundations and separate boards of trustees, (*a*) National College of Pharmacy, (*b*) College of Veterinary Medicine

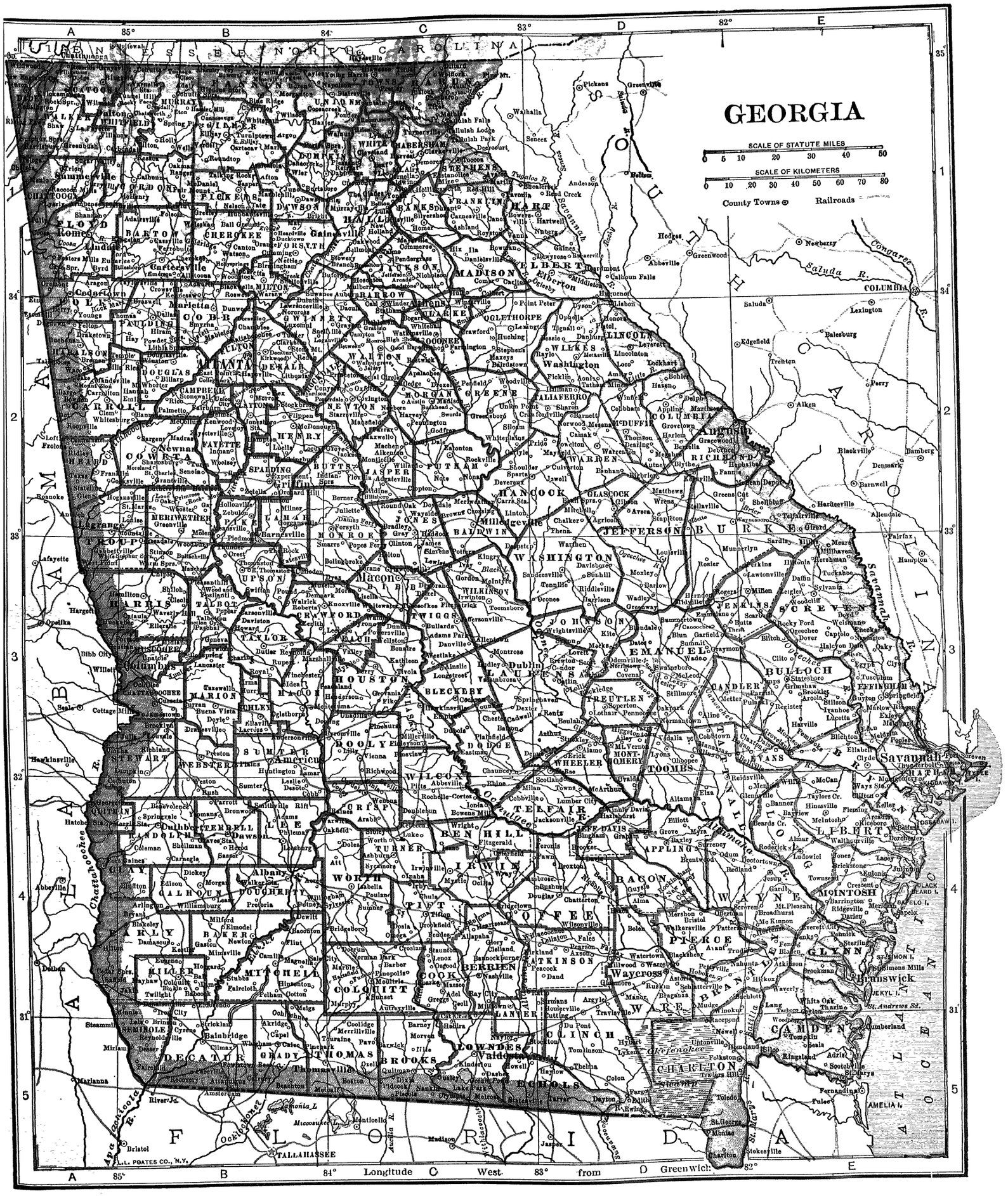
In the academic year 1912–13 the university registered 1347 students From 1821 to 1913 it granted 7912 degrees on 6390 persons The president in 1914 was Charles H. Stockton, LL.D

GEOR/GIA (Pers. *Gurjistān*, Armen *Vrastan*, Lat *Iberia*, Russ *Grusia;* influenced in popular etymology by the name of the patron saint *George*) A region in Transcaucasia, constituting, until the year 1799, an independent kingdom and now forming the main part of the Russian governments of Tiflis and Kutais It comprises the ancient Iberia, Colchis, and Albania The native name of the country is Kathli, or Sakarthvélo

Tradition traces the origin of the Georgians to Thargamos, a great-grandson of Japhet Mtskhethos, the supposed builder of Mtskhetha, the ancient capital, near Tiflis, is a prominent figure in their legendary history They are known to have submitted to Alexander the Great and to have been freed from foreign rule and united in one kingdom by Pharnabazus, who ruled from 302 to 237 B C. Georgia was invaded by Pompey in 65 B C and by Trajan in 114 A D Georgia was Christianized during the fourth century. A Sassanide dynasty was established in 265 A D, and continued with a half-century's interregnum until 571, when the long line of Bagratian sovereigns (see BAGRATIDES) came to the throne The latter drove out the Arab invaders who had subjected the Sassanide princes, reunited the disorganized country, and advanced its civilization and material welfare In 787, however, the Arabs completely overran the country and imposed their will and religion on the Georgians In the eleventh century the country was temporarily brought under the yoke of the Seljuk Turks, but regained its independence under David III (1090–1125) Until the thirteenth century, when it was conquered by the Mongols under Genghis Khan, Georgia prospered greatly and increased in extent under a series of able sovereigns Under Queen Tamara (1184–1212), who married a Russian prince and thus initiated the intimate connection of Georgia with Russia, the country attained the height of its prosperity and power Towards the end of the fourteenth century Timur subdued Georgia, but was expelled in the beginning of the next century by George VII Alexander I, who succeeded George VII, divided the kingdom among his three sons Each of these states was again divided, and at one time 26 different princes reigned in Georgia The history of Georgia now falls into two parts that of the eastern states, Karthli and Kakheth, and that of the western states, including Imeritia, Mingrelia, and Guria This division was fatal to the independence and power of Georgia From 1638 to 1650 several of these sovereigns took the oath of allegiance to the Czar of Russia From the sixteenth to the eighteenth century the eastern states were oppressed by Persia, and in 1799 George XIII resigned in favor of Paul, Emperor of Russia In 1802 the Emperor Alexander proclaimed the territory a Russian province Of the three states forming western Georgia, Guria fell into the hands of Russia in 1801 and formally surrendered itself to that Empire by the Treaty of 1810, Mingrelia was virtually added to Russia in 1803, Imeritia had been acquired by Russia towards the close of the eighteenth century (1798) Consult Khakhanoff, *Aperçu géographique et abrégé de l'histoire et de la littérature georgienne* (Paris, 1900), and Marr, *History of Georgia* (in Russian) (St Petersburg, 1906) See GEORGIAN, or IBERIAN, or GRUSINIAN LANGUAGE, GEORGIANS

GEORGIA (named in honor of George II of England). A South Atlantic State and one of the original thirteen States of the American Union (Map United States, J 4) It is bounded on the north along the parallel of lat 35° N by Tennessee and North Carolina, on the east by South Carolina and the Atlantic Ocean, on the south by Florida, and on the west by Alabama Georgia ranks nineteenth in size among the States of the Union, is the largest State east of the Mississippi, the area being 59,265 square miles, of which 540 square miles are water The extreme length from north to south is 320 miles, and the greatest breadth 253 miles

Geology All the large divisions of geological time, except the Jura-Trias, are well represented in Georgia Metamorphic or crystalline rocks, mostly of Archean age, without distinct stratification but prevailingly schistose, including granite, gneiss, etc., characterize the whole of the piedmont region, commonly known as middle Georgia The rocks of the northeastern mountains, including gneiss, quartzite, mica schist, marble, etc, are also metamorphic, but probably of later age than the piedmont granites In most of the metamorphic counties are found narrow trap dikes having a general northwest-southeast trend, which may be Triassic, like the lithologically similar Palisades of New Jersey Near the southern border of the piedmont region is a belt of sandstone of unknown age, forming the Pine Mountains


GEORGIA
SCALE OF STATUTE MILES
0 5 10 20 30 40 50
SCALE OF KILOMETERS
0 10 20 30 40 50 60 70 80
County Towns
Railroads
TENNESSEE
NORTH CAROLINA
SOUTH CAROLINA
ALABAMA
FLORIDA
Longitude West from Greenwich
A 85° B 84° C 83° D 82° E
35 34 33 32 31
1 2 3 4 5
Atlanta
Augusta
Savannah
Columbus
Macon
Albany
Brunswick
Valdosta
Rome
Gainesville
Athens
Milledgeville
Dublin
Thomasville
Bainbridge
Cedartown
Marietta
Newnan
Griffin
Waycross
Cuthbert
Dawson
Sparta
Washington
Lexington
Greenville
Hawkinsville
Eastman
Statesboro
Swainsboro
Vidalia
Hazlehurst
Douglas
Blakely
Donalsonville
Cairo
Moultrie
Tifton
Quitman
Thomasville
Bainbridge
Decatur
Seminole
Colquitt
Mitchell
Baker
Early
Calhoun
Clay
Randolph
Terrell
Lee
Dougherty
Worth
Turner
Irwin
Tift
Coffee
Berrien
Cook
Brooks
Lowndes
Echols
Clinch
Ware
Pierce
Atkinson
Bacon
Wayne
Glynn
Camden
Charlton
Chatham
Bryan
Liberty
Long
Tattnall
Evans
Bulloch
Screven
Jenkins
Burke
Emanuel
Candler
Toombs
Montgomery
Treutlen
Wheeler
Telfair
Jeff Davis
Appling
Ben Hill
Wilcox
Dodge
Bleckley
Laurens
Johnson
Twiggs
Wilkinson
Washington
Jefferson
Glascock
Warren
Taliaferro
Greene
Morgan
Putnam
Hancock
Baldwin
Jones
Monroe
Bibb
Houston
Peach
Crawford
Upson
Pike
Lamar
Meriwether
Talbot
Taylor
Macon
Marion
Schley
Sumter
Webster
Stewart
Quitman
Randolph
Terrell
Lee
Dougherty
Calhoun
Clay
Early
Baker
Mitchell
Miller
Decatur
Grady
Thomas
Brooks
Lowndes
Echols
Clinch
Ware
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Long
Tattnall
Evans
Bulloch
Screven
Jenkins
Burke
Emanuel

The valley and plateau region in the northwestern corner of the State, comprising about 10 counties (northwest Georgia), is made up of Paleozoic rocks, mostly limestone, sandstone, shale, and chert, distinctly stratified but very much folded and faulted in places, ranging from Cambrian to Carboniferous The last is chiefly confined to the plateaus in the extreme northwest

The coastal-plain deposits—Cretaceous, Tertiary, and Quaternary—mostly sand, clay, and marl, with not much hard rock, cover about three-fifths of the State, known as south Georgia The Cretaceous strata underlie the fall-line sand hills which extend nearly across the State, and the gray-marl region southeast of Columbus The Eocene, Oligocene, Miocene, and Pliocene divisions of the Tertiary form successive belts between the Cretaceous and the coast, their strata dipping gently southeastward The Pleistocene, or Quaternary, is represented by peat deposits, dunes, river terraces, etc, and perhaps by a thin mantle of sand which covers most of the coastal plain, though the last is now regarded by some geologists as a mere product of weathering of the Cretaceous and Tertiary strata

Topography and Scenery. In the extreme northwest corner of the State are Sand and Lookout mountains, portions of the Cumberland plateau of Tennessee and Alabama, covering parts of two counties These mountains, capped with Carboniferous sandstone (coal measures), have comparatively flat tops, several miles wide, averaging about 1000 feet above the adjacent valleys or 2000 feet above sea level. The remainder of the Paleozoic region is mostly narrow chert and sandstone ridges, of lesser elevation than the plateaus just mentioned, and broad shale and limestone valleys, having a general north-northeast to south-southwest trend There are several caves in the valleys

The northeastern mountain region terminates on the west in a bold escarpment, 500 to 2000 feet above the neighboring Paleozoic valleys The whole region is mountainous, with many peaks 2000 to 5000 feet above sea level, and sharp ridges and narrow valleys radiating from them in a very irregular manner, the whole affording some magnificent scenery

The piedmont region ranges in altitude from about 1500 feet at the foot of the mountains to 300 feet or less along the fall line Its topography is characterized by broad rounded ridges and comparatively narrow valleys, averaging perhaps 100 feet deep From most elevated points in the region the horizon appears nearly level, but there are quite a number of isolated peaks standing out conspicuously above the surrounding country, such as Kennesaw Mountain in Cobb County (1809 feet above sea level), Stone Mountain in Dekalb (1686 feet), Little Stone Mountain in the same county, Alcovy Mountain in Walton, and Graves Mountain in Lincoln By far the most striking of these is Stone Mountain, which is plainly visible and easily reached from Atlanta It is a massive dome of granite, over a mile in diameter and about 700 feet high, with the north side almost perpendicular Being mostly bare of vegetation and variegated with vertical stripes made by water running over the smooth rock in rainy weather, it presents a sight never to be forgotten In the southern part of the piedmont region, between Griffin and Columbus, are the southernmost mountains in the eastern United States, two sandstone ridges approximately parallel to the fall line The northern and larger of the two, known as Pine Mountain, extends from near Barnesville to the Chattahoochee River, and its summit is in some places about 1300 feet above sea level, or 800 feet above the country on either side The Flint River cuts through it near its centre, making some very picturesque scenery Oak Mountain, a few miles farther south, is smaller in every way

The boundary between the piedmont region and the coastal plain is known as the fall line because most of the rivers which cross it have shoals or rapids there

The coastal plain is not in the least mountainous, its maximum elevation along the fall line being about 700 feet, but its topography is considerably diversified It is traversed by a few inland-facing escarpments, the most pronounced of which are in the western half of the State, at the inland edge of the Eocene red hills and of the rolling wire-grass country, or Altamaha Grit region Towards the coast and along some of the rivers there are some evidences of low terraces facing seaward

In the gray-marl region southeast of Columbus there are narrow ridges and broad valleys something like those of northwest Georgia on a small scale The southern red hill region is characterized by broad ridges and valleys something like those of the piedmont, except that the valleys are usually more or less swampy The lime-sink region has a gently undulating surface, with many shallow ponds and few streams. Near its south edge in Grady County there is a remarkable bit of scenery in the shape of a lime sink about 50 feet deep, into which a small stream plunges perpendicularly, making a beautiful waterfall. There are a few caves and lakes in the same neighborhood

The rolling wire-grass country is moderately hilly to nearly level, with many streams, some of the smaller ones being in valleys as much as 50 feet deep Shallow ponds, which dry up in spring, are common in the more level portions From the inland edge of this region to the coast the topography gradually flattens, and most of the area within 50 miles of the coast is less than 100 feet above sea level In the flat country, however, the scenery is somewhat diversified by numerous swamps and ponds and a few low terraces and ridges From a few miles west of Jesup a broad low ridge, parallel to the coast and 40 miles distant from it, extends southward into the great bend of the St Mary's River and some distance into Florida Although it is less than 100 feet high, and its slopes are very gentle, the flatness of the country on both sides of it makes it rather conspicuous Immediately west of this ridge (as if dammed up by it), near the Florida line, is Okefinokee Swamp, (q v), a little-known but beautiful wilderness about 700 square miles in extent

Along the south border of the State, between Valdosta and Bainbridge, is a more diversified region, with low hills, comparatively rich soil, and considerable hammock (q v) vegetation. The coast is bordered by a series of islands of various shapes, with sand dunes on their outer edges and extensive salt marshes between them and the mainland

Waterways. Every part of Georgia, except the lime-sink region and some of the flat coun-

try near the coast, is well supplied with streams. Most of the rivers take fairly direct courses to the Atlantic Ocean and Gulf of Mexico, except in a few of the northernmost counties, where some of the drainage is into the Tennessee River and thus through Alabama, Tennessee, and Kentucky into the Ohio and finally into the Mississippi.

The rivers of the northwestern valley region are mostly sluggish, and the Coosa is navigable from Rome some distance down into Alabama In the mountain and piedmont regions the rivers are full of rapids, and there is no steamboat navigation, but a vast amount of water power, which is used by many factories and hydroelectric plants. The greatest water powers are just above the fall line at Augusta and Columbus and have contributed largely to the development of those cities It has been estimated that the total available water power in Georgia, for the lowest stage of the streams, is nearly 500,000 horse power This makes no allowance for storage reservoirs, which might be expected to double the minimum water power There is no water power in the coastal plain except on some of the smaller streams in the more elevated portions.

The five large muddy rivers which cross the fall line in Georgia, viz, the Savannah, Oconee, Ocmulgee, Flint, and Chattahoochee, are navigable most of the way across the coastal plain, the first and last all the way (to Augusta and Columbus), and the others usually to Dublin, Hawkinsville, and Albany respectively The streams which rise below the fall line and are thus confined to the coastal plain are, as a rule, coffee-colored (from vegetable matter) instead of muddy, and are too small for much navigation except in the tidal portions near their mouths.

Between the sea islands above mentioned and the mainland there is an intricate system of crooked tidal channels, forming a continuous protected waterway the whole length of the Georgia coast and some distance into South Carolina and Florida, for sailboats and power boats of light draft. The principal seaports are Savannah, Brunswick, Darien, and St Mary's, in the order named

Climate Owing to its considerable extent from north to south (4½° of latitude), combined with the fact that the highest elevations are close to the north border and the lowest at the south, Georgia has a wide range of climate. At Clayton, near the northeast corner, 2100 feet above sea level, the average temperature for January is 40° F, for July 74 4° F, and for the year 56 9° F, with a growing season (period free from killing frosts) of 187 days, or scarcely more than half the year, while the mountain summits in the vicinity, nearly 3000 feet higher, must be considerably colder In the whole northeastern mountain region the climate is too cold for the successful cultivation of cotton, which seems to require a growing season of at least 200 days At St Mary's, in the southeast corner of the State, the average temperature for January is 52 4° F, for July 81° F, and for the year 67.4° F, with a growing season of 263 days or nearly nine months. For the whole State the average temperature is just that which mankind finds most comfortable

The lowest officially recorded temperature in Georgia is 12° below zero F. (though it doubtless falls below this figure on the higher mountains, where no one lives), and the highest 108° F. Snow falls in the mountains several times each winter, and there was 24 inches of it at Rome in December, 1886, and 26½ inches at Diamond, Gilmer Co, in February, 1895 Along the southern border of the State several years sometimes elapse between snows

The average annual precipitation ranges from about 40 inches at Swainsboro, in the southeastern portion, to 69 inches at Clayton, and doubtless still more at higher altitudes Outside of the mountains the total precipitation does not seem to be correlated very closely with altitude or distance from the coast or any other known factor Some of the extreme figures for single years are 101½ inches at Diamond in 1889 and less than 30 inches at Augusta in 1904

The rainfall is pretty well distributed over the seasons, no station having less than two-fifths or more than two-thirds of the total annual precipitation in the six warmest months (May to October) The driest summers seem to be at Rome, in northwest Georgia, where 42 6 per cent of the rain falls in the six warmest months and 30 2 per cent in the four warmest months, and the wettest (proportionately) along the coast, where nearly two-thirds of the rain comes in the six warmest months and about half in four months

In general, the amount of summer rain increases towards the coast, except that it is greater in the mountains than at lower altitudes near by

West Indian hurricanes sweep the coast every few years in late summer or fall, and tornadoes sometimes cut narrow swaths in the interior, mostly in the western half of the State and in spring or early summer, averaging probably not more than one in two or three years for the whole State, or one in 1000 years for any one locality

Arlington was damaged in that way in 1897, Gainesville in 1903, and Griffin and vicinity in 1908.

Vegetation. Georgia was originally completely covered with forests, except for a few grassy glades and mountain summits ("balds") in the northern half, a few lakes or large ponds in the southern half, salt marshes, beaches, and shifting dunes along the coast, and the channels of rivers Approximately 67 per cent was still wooded at the time of the last census, but probably not over half of that is virgin forest

In the northern half the forests are generally composed of short-leaf pines and deciduous trees in approximately equal proportion, except that west of a line drawn from Rome to Macon there is a considerable admixture of long-leaf pine White pine and hemlock grow in several of the northeastern mountain counties Long-leaf pine, the most important tree of the South, is found in every county in south Georgia, but is not very abundant in the Cretaceous and Eocene regions. On the Pine Mountains of western middle Georgia, previously mentioned, and still more on the fall-line sand hills and in the lower three-fourths of the coastal plain (except in the southern hammock region and along the coast), it is the dominant feature of the landscape The forests of this pine are generally very open and sunny, with an undergrowth of wire grass and other low plants

Swamps of various kinds are chiefly confined

to the coastal plain, and in them are found cypress and various oaks, bays, gums, etc, rarely seen north of the fall line Many of the swamps, especially coastward, are bordered by hammocks (q v), in which the evergreen magnolia, evergreen willow oak, red bay, dogwood, hop hornbeam, etc, are usually conspicuous The "Spanish moss" (*Tillandsia usneoides*), an epiphyte which is abundant in the lower and damper parts of the coastal plain, gives a somewhat tropical touch to the landscape

In the flat pine woods within 50 miles of the coast the saw palmetto (*Serenoa*) is a characteristic feature of the undergrowth, its stiff fanlike leaves rising to an average height of about 2 feet from a prostrate trunk The cabbage palmetto (*Sabal palmetto*), the only arborescent palm in the eastern United States outside of Florida, grows on several of the sea islands and in a few places on the mainland near by

Evergreens are most abundant where the soil is poorest and the summers wettest. They probably constitute about 50 per cent of the forest on the higher mountains and 75 per cent in the coast counties

There are about 140 species of trees in Georgia, including 10 pines, about 25 oaks (at least one of these confined to Georgia), 5 or 6 ashes, 5 gums (including sweet gum, which belongs to a different family from the other four), 4 or 5 maples, 6 or 7 magnolias, 4 elms, and at least 6 hickories Two or three of the pines are more abundant than any other species, and probably some of the oaks next

Mineral Resources. Gold was found in White County in 1829, and 10 years later the gold-mining industry had reached such importance that a branch mint was established at Dahlonega Both quartz and placer mines occur, but most of the output at the present time is made from the former type of deposits, which occur along the southern slopes of the Blue Ridge Iron ore is mined at several localities in the Paleozoic region, where there are also valuable deposits of ochre, manganese, and bauxite under exploitation Among nonmetallic products, coal, clay, marble, and granite are most important The coal fields are located in Dade and Walker counties and are an extension of the Warrior field of Alabama Brick clays and fire clays are widely distributed throughout the State, but mining is limited practically to localities near the larger towns The marble industry for several years past has steadily grown in importance, owing to the reputation which Georgia marble has gained all over the United States as a valuable building and ornamental stone Various qualities of granite suitable for building, street paving, and monumental work are quarried, and the State's resources in this stone are inexhaustible. Among the other mineral products of Georgia are silver, copper, pyrite, graphite, asbestos, talc, mica, corundum, cement, slate, kaolin, ochre, barite, marl, and limestone.

Mining Georgia is of relatively minor importance in the value of its mineral output, although it ranks second among all the States in the production of five mineral substances—asbestos, barytes, bauxite, mineral paints, and fuller's earth In relative importance among the States in the production of minerals it ranks thirty-seventh, with an aggregate annual output at a little over $6,000,000. No metal of any importance is produced except iron, and the only mineral fuel mined is coal, a small amount of which is produced annually in the northwest corner The branches of the mining industry that furnish the principal portion of the product are the quarries and the clay-working establishments In the production of stone Georgia ranks first among the Southern States and eleventh among all the States of the Union It is third among the Southern States and twelfth among all the States in the value of its clay products Its granites have a high reputation for building, and Georgia marbles are highly praised for their structure and decorative possibilities The total value of the stone production in 1913 was $2,105,366, compared with $1,983,016 in 1912 The principal stone-quarrying counties are Dekalb and Hancock for granite and Pickens for marble The manufactured clay products in 1913 were valued at $2,692,619, a decrease from $2,806,541 in 1912 In addition to the manufactured clay products, 75,815 short tons of raw clay, valued at $244,953, were sold in 1912 Common brick represents about 60 per cent of the total manufactured clay products, and sewer pipe less than 25 per cent Bibb County is the principal clay-working county and the chief producer of common and front brick and sewer pipe Common brick is also extensively manufactured in Richmond and Fulton and other counties The principal raw-clay product is white clay used in the manufacture of paper, of which in 1912 Georgia produced 48,432 short tons, valued at $210,908 The State is the principal producer of this grade of clay

The production of coal, which, as stated above, is limited to the northwest corner of the State in Dade and Walker counties, was, in 1913, 255,626 tons, valued at $361,319, compared with 227,503 short tons, valued at $338,426, in 1912 The production of cement decreased from 368,462 barrels, valued at $330,186, in 1911, to 359,769, valued at $311,616, in 1912 Georgia is one of the chief sources of supply for ochre, of which 11,869 tons, valued at $123,616, were produced in 1913 Other productions of considerable importance are bauxite, 19,587 tons, valued at $80,701; fuller's earth, asbestos, barytes, lime, pyrite, and sand-lime brick A small amount of gold is mined In 1912 this amounted to 695 fine ounces, valued at $14,360 In the same year 135,337 long tons of iron ore, valued at $227,282, were taken from the iron mines of the State The total value of the mineral products in 1913 amounted to $6,525,792, compared with $6,306,140 in 1912

Fisheries The fisheries of the State are not relatively important The most important product of this industry is the oyster, of which in 1908, the latest year for which statistics are available, 1,423,000 bushels were taken. These were valued at $332,990 Next in importance was shad, of which 1,333,300 pounds, valued at $190,000, were taken in 1908 Of some importance are the catches of red snapper, terrapin, turtles, catfish, sea bass, and squeteague, or trout The total value of the products of the State in 1908 was $699,660

Agriculture Agriculture is the most important industry of the State There is an abundance of land adapted to the successful growing of crops The soils are extremely varied, ranging from gray and yellow sandy loams to heavy red sandy loams and red clays The principal soils of the piedmont region are

a heavy red clay and a gray sandy loam with a heavy red clay subsoil The soils of the eastern portion of the mountain region are red loams, and clays derived from the weathering of the metamorphic rocks of this section Within the western mountain and plateau regions the soils are principally sandy and silty loams derived from the weathering of sandstone and shale are not extensively used for agricultural purposes The soils of the limestone valleys consist either of dark-brown or red clay loam and clay soils, or of cherty-gray silty loams or stony loams Extensive areas of the mountain section of northern Georgia are covered by forest.

The approximate land area of the State is 37,584,000 acres, and of this there were in farms, in 1910, 26,953,413 acres, compared with 26,-392,057 acres in 1900 The improved land in farms in 1910 was 12,298,017 acres, compared with 10,615,644 acres in 1900, or an increase of 15 8 per cent in the decade The total number of all farms in the State in 1910 was 291,027, compared with 224,691 in 1900, a gain of 63,-336 farms, or 29 5 per cent. The average acres per farm in 1910 were 92 6, compared with 117 5 in 1900 The total value of the farm property of the State, including land, buildings, implements and machinery, domestic animals, poultry, and bees, was, in 1910, $580,546,381, compared with a value in 1900 of $228,374,637 This is a gain of $352,171,744, or 154 2 per cent in the decade The average value of all property per farm increased from $1016 in 1900 to $1995 in 1910, and the average value of land per acre increased from $5 25 in 1900 to $13 74 in 1910 Since 1870 the increase in improved acreage has been relatively greater than in the total farm acreage, the proportion of improved acreage rising continuously from 28 9 in 1870 to 45 6 in 1910.

The average size of farms in the State has decreased continuously from 440 9 in 1850 to 92.6 acres in 1910. The decline was most rapid in the decade from 1870 to 1880 In 1850 and in 1860 the "plantation" was the common farm unit in a considerable part of the State, as it had been during the entire first half of the century, and it had not entirely disappeared even in 1870 During the last 40 years most plantations have been divided gradually into smaller parcels of land, operated largely by tenants Of the total number of farms in 1910 (291,027), 98 628 were operated by owners, 1419 by managers, and 190,980 by tenants Tenants, according to the character of their tenancy, numbered 105,504 share tenants, 3089 share-cash tenants, and 75,223 cash tenants While the total number of farms increased 109 9 per cent from 1880 to 1910, the number of tenants increased 207 2 per cent It will be noted, therefore, that by far a larger part of the farms of the State are operated by tenants, but nevertheless the greater farm area is operated by owners. This included 55 1 of all land in farms in 1910, while only 42 per cent of the land area in farms was operated by tenants.

The relative participation of the white and colored population in farming in Georgia is of interest as tending to show in a State in which a large proportion of the population is colored, the development of that race in agricultural pursuits The total land area owned, managed, or leased by white farmers in 1910 was 19,861,362 acres, and the improved land in farms was 7,506,455 acres In 1900 the total acreage was 20,917,083, while the improved acreage was 7,292,998 For colored owners, managers, and tenants, the total acreage in 1910 was 7,092,051 The improved land in farms was 4,791,562 In 1900 the total acreage was 5,474,974, while the improved land was 3,322,-646 The total value of farm property owned or leased by white farmers was, in 1910, $350,-320,600, compared with $144,028,880 in 1900. The value of the land owned or leased by colored farmers in 1910 was $128,883,732, compared with $39,341,240 in 1900 It will thus be seen that the total acreage, the improved land in farms, and the value of farm property owned by colored farmers has increased more rapidly than that owned by white farmers Of all the land in farms operated by white farmers in 1910, 68 per cent was in farms operated by their owners, and 28 2 in tenant farms, while of that in farms operated by colored farmers, 19 per cent was in farms operated by owners and 80 6 per cent in tenant farms Between 1900 and 1910 the proportion of land in farms operated by owners decreased among white farmers, while among colored farmers it showed an increase The white farm operators in 1910 numbered 168,468, or 57 9 per cent, while 122,559, or 42 1 per cent, were nonwhites Of these all but five were negroes The average size of farms operated by white farmers in 1910 was more than twice as large as that of farms operated by colored farmers The average size of the former was 117 9 acres and of the latter 57 9 acres Both classes of farms decreased in size between 1900 and 1910 The proportion of land improved was larger for farms of colored farmers than for those of white farmers, being respectively 67 6 per cent and 37 8 in the total acreage in each class of farms

Of the 98,628 farms owned in 1910, 78,004 were free from mortgage, while 18,275 were mortgaged The average debt per farm was $794, while the average equity per farm was $1918.

The general character of farming operations in the State is indicated by the table below,

LEADING CROPS		Acreage	Prod bu	Value
Corn	1913	4,066,000	63,023,000	$57,351,000
	1909	3,383,061	39,374,569	37,079,981
Wheat	1913	140,000	1,708,000	2,050,000
	1909	93,065	752,858	871,494
Oats	1913	420,000	9,240,000	6,283,000
	1909	411,664	6,199,243	4,236,625
Rye	1913	13,000	124,000	167,000
	1909	12,352	59,937	69,365
Rice	1913	500	16,000	13,000
	1909	6,445	148,698	145,813
Potatoes	1913	12,000	972,000	1,021,000
	1909	11,877	886,430	684,427
Sweet potatoes	1913	83,000	7,221,000	4,910,000
	1909	84,038	7,426,131	4,349,806
Hay	1913	250,000	350,000 *	6,265,000
	1909	253,157	261,333	4,056,907
Tobacco	1913	1,800	1,800,000 †	558,000
	1909	2,025	1,485,994	297,167
Cotton	1913	5,328,000	2,275,000 ‡	139,135,000
	1909	4,883,304	1,992,408	126,695,612

* Tons. † Pounds. ‡ Bales of 500 pounds each.

which shows the acreage, production, and value of the leading crops in 1909 and 1913. The figures for 1909 are from the thirteenth census, and those for 1913 are estimates of the United States Department of Agriculture

The relative importance of cotton in the agricultural industry of the State is shown by the fact that about two-thirds (66 2 per cent) of the total crops in 1909 was contributed by cotton and somewhat less than one-fifth (18 7 per cent) by cereals The remainder, representing 15 1 per cent of the total, consisted for the most part of potatoes and other vegetables and of forest products The leading crops in the order of their importance as judged by value are cotton, corn, cottonseed, sweet potatoes and yams, oats, and hay and forage The acreage of the combined cereals is about four-fifths that of cotton, while their value is only about one-third that of this latter crop Corn ranks first among the cereals, representing about seven-eighths both of the total acreage and the total value There has been a constant increase in the acreage of cotton in recent years The largest increase was during the decade 1900–10, when it amounted to 1,369,465 acres The output of cottonseed in 1909 was 996,204 tons, valued at $23,241,446 During the same decade the production of corn decreased slightly, while oats made a slight increase The acreage of hay and forage has increased very rapidly during the last two decades The growing of peanuts has become an important industry, and since 1889 the acreage has increased with great rapidity, more than trebling since that year.

The acreage of cotton is distributed more or less generally throughout the State, except in the mountains and near the coast. The largest acreages, however, are reported for counties located in the lowlands and river bottoms, as Burke, Laurens, Meriwether, and Sumter The acreage of corn is also distributed very evenly throughout the State As a rule, those counties which have large acreages of cotton have also large acreages of corn. Counties in which peanuts are chiefly grown are almost entirely in the southern half of the State, the leading county being Brooks The value of the peanuts grown in 1909 was $2,440,926 The amount produced was 2,569,787 bushels from 160,317 acres The growing of sugar cane is important in south Georgia The cane grown in 1909 was 317,460 tons From this was made 22,392 pounds of sugar and 5,533,520 gallons of sirup The total value of sugar-cane products in 1909 was $2,268,000, compared with $1,481,000 in 1899

The total value of orchard fruits grown in 1909 was $2,930,793 The most important of these were peaches of which there were grown 2,555,499 bushels, valued at $2,182,613 Other fruits are apples, pears, plums, and prunes Of grapes there were produced, in 1909, 2,767,366 pounds, valued at $99,216 Figs are produced in considerable quantities The production in 1909 was 1,183,494 pounds, valued at $50,326 The most important small fruit are strawberries, of which 1,157,472 quarts, valued at $101,161 were grown in 1909

Live Stock and Dairy Products The total value of the domestic animals, poultry, and bees in 1910 was $78,118,098 The cattle numbered 1,080,316, valued at $14,060,958, horses, 120,067, valued at $14,193,839, mules, 295,348, valued at $43,974,611, swine, 1,783,684, valued at $5,429,016, sheep, 187,644, valued at $308,212 The number and value of live stock on Jan. 1, 1914, were estimated by the United States Department of Agriculture as follows: cattle other than milch cows, 660,000, valued at $8,382,000, milch cows, 402,000, valued at $12,583,000, sheep, 166,000, valued at $349,000, swine, 1,945,000, valued at $15,949,000, horses, 128,000, valued at $16,768,000, mules, 319,000, valued at $51,359,000 The total number of fowls of all kinds in 1910 was 5,328,584, valued at $2,088,563

The total value of the dairy products, including milk, cream, butter fat, butter, and cheese, made in 1909 was $6,621,585

Manufactures. Although Georgia is an agricultural rather than a manufacturing State, it has for the past 60 years been one of the leading and most progressive industrial States of the South The superior transportation facilities account in part for its rapid industrial growth during this period It is traversed by the important railway systems of the South, from which numerous feeders afford easy access to all parts of the State It possesses also the advantages of excellent water communication The growth of the manufacturing industries of the State is shown by the fact that the total value of the manufactured products, including the products of neighborhood and hand industries, amounted in 1849 to only $7,082,000, while in 1899, exclusive of the value of the products of the neighborhood and hand industries, it was $94,532,000, or more than 13 times as great as 50 years previous The increase during the decade 1900–10 was even more remarkable The value of products of the factory industries of the State had by 1909 increased to $202,863,000, a gain of 114 6 per cent in the decade, which was far in excess of the proportionate growth of the population The table on the following page gives the most important data relating to the manufacturing industries of the State in 1909, in comparison with 1904. Only industries whose product in 1909 was valued at $1,000,000, or over are shown in this table There were in Georgia, in 1909, 4792 manufacturing establishments, which gave employment to an average of 118,036 persons during the year and paid out $43,867,000 in salaries and wages

Although a few industries predominate in importance, there is a considerable diversity in the manufacturing activities of the State The most important industry is that connected with the manufacture of textiles This includes cotton goods, hosiery and knit goods, and woolen and worsted goods. The value of these manufactures in 1909 was $52,141,000, or 25 7 per cent of the total value of all the manufactured products of the State The textile industries are confined entirely to the cotton-goods branch, which is first in importance among the individual industries of the State, with a value of products in 1909 almost doubling that of the lumber and timber industry, which ranked next For a number of years Georgia has produced next to the largest cotton crop of any State, but it ranks only fifth among the States in the value of its cotton manufactures It is interesting to know that, while the percentage of increase in the value of products from 1899 to 1904 was greater than that in value added by manufacture, from 1904 to 1909 the increase in the value added by manufacture was the greater This variation was due partly to the rise in price of raw cotton during the earlier five-year period Closely allied to the cotton industry is the manufacture of hosiery and knit goods, which are made almost entirely of cotton materials. Although the value of products of this

COMPARATIVE SUMMARY FOR 1909 AND 1904

THE STATE — ALL INDUSTRIES COMBINED AND SELECTED INDUSTRIES

INDUSTRY	Census	Number of establishments	Wage earners (average number)	Capital	Wages	Cost of materials	Value of products	Value added by manufacture
				Expressed in thousands				
All industries	1909	4,792	104,588	$202,778	$34,805	$116,970	$202,863	$85,893
	1904	3,219	92,749	135,212	27,392	83,625	151,040	67,415
Agricultural implements	1909	17	552	1,410	190	583	1,117	534
	1904	16	584	792	171	602	1,040	438
Boxes, fancy and paper	1909	8	309	659	93	786	1,140	354
	1904	4	172	114	36	87	185	98
Bread and other bakery products	1909	110	491	525	213	932	1,532	600
	1904	82	396	312	138	560	935	375
Brick and tile	1909	75	1,901	2,771	547	534	1,711	1,177
	1904	59	1 446	1,814	350	365	1,337	972
Carriages and wagons and materials	1909	83	1,059	2,220	489	1,367	2,560	1,193
	1904	75	1,115	1,509	426	1,222	2,303	1,081
Cars and general shop construction and repairs by steam-railroad companies	1909	34	6,269	4,271	3,162	2,964	6,535	3,571
	1904	28	4,777	2,102	2,416	2,058	4,775	2,717
Clothing, men's, including shirts	1909	22	1,242	1,006	341	1,168	1,934	766
	1904	14	1,022	548	265	929	1,482	553
Confectionery	1909	23	648	902	225	1,432	2,172	740
	1904	16	589	656	156	969	1,570	601
Copper, tin, and sheet-iron products	1909	25	619	2,808	292	707	1,326	619
	1904	11	186	86	88	182	325	143
Cotton goods, including cotton small wares	1909	116	27,803	64,651	7,721	32,049	48,037	15,988
	1904	103	24,130	42,350	5,313	23,832	35,174	11,342
Fertilizers	1909	110	2,770	24,233	921	10,944	16,800	5,856
	1904	57	2,192	11,158	581	6,527	9,461	2,934
Flour-mill and gristmill products	1909	105	386	2,749	144	6,729	8,000	1,271
	1904	114	464	1,869	146	7,265	8,179	914
Foundry and machine-shop products	1909	107	2,892	7,993	1,452	2,662	5,808	3,146
	1904	84	3,112	5,260	1,298	2,052	5,264	3,212
Furniture and refrigerators	1909	42	1,406	2,080	508	883	2,060	1,177
	1904	32	1,828	1,904	504	902	2,115	1,213
Gas, illuminating and heating	1909	15	459	7,075	206	368	1,425	1,057
	1904	12	482	5,832	164	291	1,061	770
Hosiery and knit goods	1909	22	2,743	3,270	719	1,872	3,233	1,361
	1904	21	1,935	1,947	396	1,417	2,326	909
Ice, manufactured	1909	61	494	3,360	210	275	1,163	888
	1904	48	399	1,705	142	200	858	658
Leather goods	1909	34	683	1,426	252	1,332	2,086	754
	1904	29	1,021	1,011	330	1,325	2,072	747
Leather, tanned, curried, and finished	1909	10	306	1,267	99	1,051	1,374	323
	1904	29	533	2,406	154	1,887	2,382	495
Liquors, malt	1909	4	212	1,790	120	416	1,207	791
	1904	5	319	1,574	141	306	1,284	978
Lumber and timber products	1909	1,826	22,257	23,337	7,305	8,505	24,632	16,127
	1904	949	19,684	15,309	6,324	6,666	21,648	14,982
Marble and stone work	1909	104	2,099	2,117	998	793	2,648	1,855
	1904	50	2,018	2,924	823	626	2,408	1,782
Oil, cottonseed, and cake	1909	142	2,888	12,720	846	19,440	23,641	4,201
	1904	112	2,307	11,527	608	11,262	13,540	2,728
Patent medicines and compounds and druggists' preparations	1909	50	210	557	81	442	1,421	979
	1904	34	168	758	63	319	1,541	1,222
Printing and publishing	1909	442	2,395	4,732	1,344	1,588	6,400	4,812
	1904	359	2,066	3,770	964	1,030	3,980	2,950
Turpentine and rosin	1909	592	12,787	2,990	2,931	1,260	6,939	5,679
	1904	432	11,736	2,374	3,041	1,156	7,706	6,550

industry is small when compared with that of the cotton-goods industry in 1909, it increased 89 per cent from 1899 to 1904 and 39 per cent from 1904 to 1909 The manufacture of woolen, worsted, and felt goods is comparatively unimportant

The second industry in importance in the value of its products is that connected with lumber and timber and their manufactures It embraces establishments engaged in logging, and also saw mills, planing mills, and wooden packing-box factories Statistics of mills engaged exclusively in custom sawing for local consumption are not included The third important industry is that connected with the manufacture of oil, cottonseed, and cake This industry, which is dependent upon the cotton crop for its materials, was not important until after 1890, but since that date its growth has been rapid The fertilizer industry is fourth in importance In 1904 Georgia contributed about one-sixth the total value of the products of the fertilizer industry. The increased production of fertilizers in the State, the value of which was about five times as great in 1909 as in 1899, is due to several causes, among which were the greater demand for fertilizers, the rapid increase in the manufacture of cottonseed oil in the State, and the increase in the amount of phosphate rock mined in adjoining States

The presence of extensive pine forests has made the turpentine and rosin industry one of importance Georgia ranks among the first of the States in the production of these commodities. The industry, however, shows a decrease from 1904 to 1909 This is due in part to a depletion of the forests in certain localities of the State and in part to the unsatisfactory prices for turpentine which tended to discourage its manufacture in 1909

An examination of the table will show that in 1909 there were 104,588 wage earners employed in the industries of the State Of these, 83,998 were men and 14,549 were women 16 years of age or over The wage earners under 16 years of age numbered 6041 The larger part of the total number of women wage earners is employed in the cotton-goods industry, in which nearly one-third of the wage earners are women 16 years of age and over In the 10-year period 1899–1909 there was a small decrease in the employment of children under 16 years of age

For the great majority of wage earners employed in the industries of the State, the prevailing hours of labor in 1909 range from 60 to 72 a week Of all wage earners 23 2 per cent were employed in establishments where the prevailing hours were less than 60 a week, and only 1 4 per cent in establishments where there were more than 72 a week

Unlike some others of the Southern States, the manufacturing industries are not confined chiefly to the larger cities In 1909 establishments located outside of cities having 10,000 inhabitants or over reported 62 9 per cent of the total value of manufactured products of the State and employed 69 4 per cent of the total average number of wage earners. While very little relative change took place from the 10-year period 1899–1909, on the whole the industries of the districts outside the cities increased somewhat more rapidly in respect to value of products than those located in cities of 10 000 and over This is due largely to the fact that three of the largest and most important industries—the manufacture of cotton goods, the lumber, and the fertilizer industries—are to a large extent conducted outside of cities having a population of 10,000 or over

The increase in the industrial importance of the State is indicated by the rapid growth of its large cities from 1900 to 1910 Atlanta, which in 1900 had a population of 89,872, had increased in 1910 to 154,839 The wage earners in that city in 1909 numbered 12,302, compared with 11,891 in 1904 and 7966 in 1899 The value of the products of the manufactures of Atlanta in 1909 amounted to $33 038,002, compared with $25,745,650 in 1904 and $14,418,834 in 1899 This shows an increase of over 100 per cent in the decade Macon ranks second in the value of its products, but fourth in the number of wage earners Augusta ranks second in the number of wage earners and third in the value of products Both these cities had produced manufactured products of a value of over $10 000,000 in 1909 Columbus ranked third in the number of wage earners and had products valued at $8,551,998 in 1909 In Savannah there were 2727 wage earners and a product valued at $6,733,651 Other important manufacturing cities are Athens, Rome, Waycross, and Brunswick In all these, except the last named, the value of products in 1909 exceeded $1,000,000

Forest Products The thirteenth census reports 2083 saw mills in Georgia, with the following output of lumber, laths, and shingles for the year 1909

Conifers—"Yellow pine" (which means all the pines except white), 1,194,987,000 feet; white pine, 31,324,000, "spruce" (probably meaning spruce pine, for real spruce is not known in Georgia), 2,789,000, hemlock, 966,000, cypress (two species), 27,517,000, cedar, 1,648,000 Total coniferous wood, 1,259,231,000 feet

Hardwoods—Oak (of several species), 46,329,000 feet; yellow poplar (tulip tree), 21,472,000, red gum (sweet gum), 4,828,000, ash, 3 106,000, chestnut, 2,429,000, cottonwood, 2,260,000, hickory, 1,171,000, maple, 535,000, tupelo gum, 286,000 elm, 274,000, basswood (linden), 88,000, sycamore, 80,000, beech, 67,000, walnut, 48,000, birch, 20,000, cherry, 15,000, all others, 10,000 Total hardwoods, 83,018,000 The reports of the Census Bureau and Forest Service made in combination put the total output of lumber in 1900 at 1,308,610 thousand feet in 1900, 1,041,617 in 1910 and 941,291 thousand feet in 1912

These figures of course do not include fuel, crossties, poles, posts, staves, veneers, tanbark, naval stores (q v), etc In 1910 the production of turpentine in Georgia was 6,950,000 gallons, worth $4,509,000, and of rosin 870,000 barrels (of 280 pounds each), worth $4,637,000 These products come from the long-leaf and one or two other pines Two or three decades ago Georgia led all the other States in naval stores, but it is now outranked by Florida

There were 133,260 farms in the State which reported forest products in 1909, and the total value of these products was $8,938,390, compared with $3 217,119 in 1899 Of the value in the former year $5,734,530 was that of products used or to be used on the farms themselves, $2,502,000 as that of products sold or for sale, and $702,360 as the amount received for standing timber These figures show a substantial increase for the decade.

Transportation. See also statement under *Manufactures* The total mileage of railways on June 30, 1912, was 7066 There were, in addition, 80 miles of double track The railways having the longest mileage in the State in 1912 were the Central of Georgia Railway, 1331, Southern Railway, 909, Seaboard Air Line, 744, Atlantic Coast Line, 707, Atlanta, Birmingham, and Atlantic Railroad, 484, Georgia and Florida Railway, 310, and the Georgia Railroad, 303 The city of Savannah is one of the most important seaports of the South, and the Savannah, Chattahoochee, Ocmulgee, Altamaha, and Oconee rivers are navigable for considerable distances The Federal government has for several years been engaged in excavating a channel 26 feet deep in Savannah harbor. The government has also done considerable work in the Savannah River below Augusta See *Waterways* above

Education In common with other Southern States, Georgia has had problems relating to education which have been difficult to solve and which indeed cannot be solved for many years The negro population constitutes nearly half of the total population of the State, and there is also a large and scattered rural population, the providing of which with satisfactory educational facilities is extremely difficult It is the disposition of the people and of the Legislature, however, to make as rapid advance in matters concerning education as is possible under the circumstances. The Legislature has passed many local laws concerning education which have in a measure obviated the need of general legislation. If a good idea is advanced and finds favor in a certain community, that community can readily, as a rule, secure legislative consent to its adoption and need not disturb other communities in doing so. There were in the State in 1912 over 80 districts organized under laws of their own choosing, and nearly every modern idea in constructing a separate school system can be found in some one or more of the special laws of the State

That education is advancing in Georgia is shown by the fact that from 1900 to 1912 the public-school enrollment increased from 484,385 to 571,230, the State appropriation from $1,440,642 to $2,550,000, the average length of the school year from 110 days to 142 days, and the number of teachers from 9692 to 13,105 From 1900 to 1910 the white illiterates in the State decreased from 11 9 to 7 8 per cent, and the negro illiterates from 52 to 36 5 per cent It must be considered, in connection with the negro illiteracy, that, following the close of the Civil War and for many years after, almost all of the colored population was illiterate. The total number of illiterates in the State in 1910 was 389,775 Of these 80,203 were native whites and 308,639 were negroes The illiterates in 1900 numbered 480,420, of whom 100,431 were native whites and 379,067 were negroes In the percentage of illiteracy Georgia stands about midway among the Southern States. It ranks above Mississippi, North Carolina, South Carolina, and Alabama Among all the States Georgia ranks forty-third in the matter of literacy This low rank is due chiefly to the large negro population, there are more of the colored race in Georgia than in any other State in the Union There are several counties, however, where the white illiteracy is large Of the number of pupils enrolled in the public schools, only six States in 1912 ranked below Georgia, and 44 of the States had more money invested in school property Indeed only three States—North Carolina, South Carolina, and Mississippi—have spent less for this purpose Only four States—Mississippi, Alabama, North Carolina, and South Carolina, in the order named—have a smaller annual expenditure for their school children than Georgia In salaries paid to teachers Georgia ranks low. The average is about $250 a year, while the average for the United States is about $485

The total enrollment in the public schools of the State in 1912 was 571,230 Of these 348,571 were white and 222,659 were colored The average attendance for white pupils was 226,914 and for colored pupils 130,329 The pupils in the high schools numbered 23,714, of whom 22,797 were white and 917 were colored The total number of schools in 1912 was 7840, of which 4782 were for white pupils and 3058 for colored The teachers numbered 13,105, of whom 9053 were teachers in white schools and 4052 in colored schools The average monthly salary paid to white male teachers in the county systems was $66, and to white female teachers $44 44 For colored male teachers in the county systems the average was $26 80, and for colored female teachers $20 85 In special systems the average monthly salary paid to white male teachers was $140, and to white female teachers $58 92. The average salary for colored male teachers under the special systems was $31, and for colored female teachers $30 The total value of school property and equipment in 1912 was $12,344,595, and the total number of schoolhouses was 6907 The amount raised by local taxation for the support of schools was $1,819,860, and the amount given by the State was $2,550,000

Georgia is one of the six States having no form of law with regard to compulsory school attendance While conditions render it inadvisable to attempt radical legislation along this line, the State Commissioner of Education in his report for 1912 suggests that it should be possible to secure legislation that will be helpful through moral as well as legal effect, inflict no hardship upon people, and give ground upon which to stand for further advancement later

The Legislature of 1911 passed an educational reform bill which in many particulars was an excellent measure The Act, however, does not apply to Atlanta, to a few county districts, or in most of its details to special incorporated school districts The title of the chief executive officer of the State was changed from School Commissioner to Superintendent of Schools There were, in 1913, 11 district agricultural schools The results attained in these schools have been very successful There are high schools in nearly all the largest cities These high schools have to a large extent superseded nearly all the academies, of which there were many in the State previous to the Civil War. In 1913 there were 95 public four-year high schools and 24 private high schools on the accredited list

Normal schools include the Georgia Normal and Industrial College at Milledgeville, the South Georgia State Normal College at Valdosta, and the State Normal School at Athens. The institutions for higher education include the

University of Georgia (for men) at Athens, the Georgia School of Technology at Atlanta, the North Georgia Agricultural College at Dahlonega, Andrew Female College at Cuthbert, Agnes Scott College for Women at Decatur, Piedmont College at Demorest, Bessie Tift College (for women) at Forsyth, Brenau College (for women) at Gainesville, Lagrange College (for women) at Lagrange, the Southern Female College at Lagrange, Mercer University (for men) at Macon, Wesleyan Female College at Macon, and Shorter College (for women) at Rome Lamar College was founded at Clarkston, near Atlanta, under the auspices of the Christian church, in 1913 Emory College, at Oxford, became in 1914 the collegiate department of a new university established by the Methodist Episcopal Church, South, under the name of Emory University In addition there were the following colleges for colored students Atlanta Baptist College at Atlanta, Atlanta University at Atlanta, Morris Brown College at Atlanta, and Clark University at South Atlanta There is also a State normal and industrial college for colored youths at Savannah

Banks On Aug 9, 1913, there were in the State 116 national banks, with a capital of $14,268,500, deposits subject to check of $40,635,215 There were 612 State banks, with a capital of $20,857,753, deposits subject to check amounting to $25,886,454, and savings deposits amounting to $10,462,647 In addition to these there were 28 stock savings banks, with 44,852 depositors, and deposits aggregating $1,412,064, 6 private banks, with deposits amounting to $264,230, and 22 loan and trust companies, with deposits subject to check amounting to $5,904,753 and savings deposits amounting to $3,213,575.

Finance. The report of the State Treasurer showed a balance at the beginning of the fiscal year 1913 of $1,113,517 The receipts for the year ending Dec 31, 1913, amounted to $6,907,138 The disbursements amounted to $7,281,030, leaving a balance on Dec 31, 1913, of $739,625 The chief disbursements were for the State institutions, State departments, schools, pensions, and interest on the public debt The bonded debt of the State on Dec 31, 1913, was $6,630,702 Of this amount $3,679,000 in bonds matures in 1915

Population. The growth of the State has been steady It has never risen above the ninth nor fallen below the thirteenth place in rank In 1910 it held tenth place among the States After Texas, Georgia is the most populous of the Southern States, although the density of population per square mile (44 4) in 1910 is exceeded by some others The population in 1790 was 82,500 Since 1850, by decades it has been as follows 1850, 906,000, 1860, 1,057,000, 1870, 1,184,000, 1880, 1,542 000 1890, 1 837 000, 1900, 2,216,000, 1910, 2,609,121, 1920, 2,895,832 The estimated population of the State on July 1, 1914, was 2,776,513 The per cent of increase of population in the decade 1900–10 was 17 7 compared with 20 6 from 1890 to 1900 As is the case with the other Southern States, the population is preponderantly rural The urban population, i e, the population in towns of 2500 or over, was, in 1910, 538,650, while the rural population was 2,070,471. As in other parts of the country, the percentage of urban population, however, shows a greater increase than the rural From 1900 to 1910 the urban population increased 43 2 per cent, while the rural increased only 12 5 per cent The white population in 1910 was 1,431,802, while the negroes numbered 1,176,987 In 1900 the white population was 1,181,294, and the colored 1,034,813 In the central part of the State the negroes greatly predominate, and in some counties they outnumber the whites The white population is almost entirely native-born Immigration into the State has been very small The whites of native parentage in 1910 numbered 1,391,058, the whites of foreign or mixed parentage 25,672, and foreign-born whites only 15,072 The population is almost exactly divided between males and females The males in 1910 numbered 1,305,019 and the females 1,304,102 While among whites males are more numerous than females, this condition is reversed among the negroes The males of voting age in the State in 1910 numbered 620,616 There were four cities with a population of 25,000 or over These are Atlanta, Augusta, Macon, and Savannah The population of these cities in 1910 and 1900 was as follows Atlanta, 1910, 154,839, 1900, 89,872—Savannah, 1910, 65,064, 1900, 54,244—Augusta, 1910, 41,040, 1900, 39,441—Macon, 1910, 40,665, 1900, 23,272 Both Atlanta and Macon showed large increases in the decade 1900–10 In the case of Atlanta this amounted to 72 3 per cent and in that of Macon to 74 7 per cent This increase is due partly to the development of manufacturing in these cities (See *Manufactures*) Other important cities in the State are Columbus, 1910, 20,554, 1900, 17,614—Athens, 1910, 14,913, 1900, 10,245—Waycross, 1910, 14,485; 1900, 5919—Rome, 1910, 12,099, 1900, 7291—Brunswick, 1910, 10,182, 1900, 9081—Albany, 1910, 8190, 1900, 4606—Americus, 1910, 8063, 1900, 7674—Valdosta, 1910, 7656, 1900, 5613—Griffin, 1910, 7478, 1900, 6857 The capital is Atlanta

Religion. The Baptist and Methodist denominations predominate, the former having about half the religious membership of the State The Methodists number (1913) about 300,000, of whom 100,000 are colored Of the smaller denominations, the Presbyterians have about 20,000 members, the Catholics, 20,000, Christians, about 10,000, and the Congregationalists, about 5000 There are 7000 Hebrews

Charities and Corrections The charitable institutions of the State include an insane asylum for whites and another for negroes, both at Milledgeville, an institute for the deaf and dumb at Cave Spring, and an academy for the blind at Macon In addition to these a number of private benevolent institutions are supported in the larger cities of the State There is also a home for Confederate soldiers There is a State penitentiary at Milledgeville In 1905 a State reformatory, for all persons under 16 years of age convicted of crime in the State, was established Counties are authorized to maintain industrial farms for those convicted of crime Georgia, in common with other States, for many years leased its convicts by private contract The system was first introduced in 1866, when convicts were leased for a term of years to private individuals In 1907 a law was passed by the Legislature by which the control of State convicts passed from the hands of agents or lessees A State-prison commission was created which had administrative authority over State institutions This commission accepted contracts for convict labor, but

the prisoners were cared for by State officials Great abuses developed in this system, and in 1907–08 an investigation was carried on which showed that many wardens had been in the pay of convict lessees and that the convicts had been subject to cruel treatment in the convict camps A special session of the Legislature met in that year, and an end was put to the convict lease system in the State By the terms of the measure passed, the leases of convicts which expired on March 31, 1909, were not to be renewed and after that date the counties were allowed to take their pro rata part of the State convicts for use upon the public works Any convicts remaining after this distribution may be employed by the prison commission in such a way as in its discretion may seem for the best interests of the State On April 1, 1909, in accordance with the terms of this Act, 2500 prisoners were transferred from various private stockades to the respective counties in which their crimes were committed In 1906 a child-labor law was passed by the Legislature By the terms of this measure no child under 10 years of age is permitted to labor in or about any factory, and after Jan 1, 1907, no child under 12 may be so employed unless an orphan with no other means of support, or unless a widowed mother or aged father is dependent upon the child's labor From Jan 1, 1908, no child under 14 may be employed in a factory between the hours of 7 P M and 7 A M, and from that date no child under 14 may be employed in any factory without a certificate of school attendance of 12 weeks, of which six weeks must be consecutive

Militia The militia organizations include three regiments of infantry of 12 companies each and one separate battalion of four companies, one squadron of four troops of cavalry and one separate troop, two batteries of field artillery, four companies of coast artillery, and six detachments of sanitary troops The total strength of enlisted men in 1913 was 2675, and the officers numbered 223 The official designation is the National Guard of Georgia

Government. The present constitution of the State was adopted in 1877 It has been amended, but not in essentials Proposed amendments must receive a two-thirds vote of all members of each House, and a majority vote of the electors qualified to vote for members of the Assembly, each amendment being voted on separately.

Executive—The executive officers of the State include the Governor, Secretary of State, Comptroller, Treasurer, Attorney-General, Commissioner of Agriculture, and a few others, all elected for two years The Governor may serve for two consecutive terms and is then ineligible for reelection for four years The President of the Senate and the Speaker of the House respectively succeed to the governorship in case that office has become vacant The Governor has the veto power, which may be overcome by a two-thirds vote of each House He has also the usual powers of granting reprieves, pardons, etc

Legislative—The legislative bodies, the Senate and the House of Representatives, compose the General Assembly The Senate is composed of 44 members and the House of not more than 184 The senatorial districts include contiguous, undivided counties Representatives are elected from counties on the basis of population, and the counties can neither be joined nor divided Elections for members of the Legislature are held biennially in October of the even years The sessions of the Legislature are annual (in summer) and limited to 50 days The seat of a member of either House shall be vacated on his removal from the district or county from which he was elected The House of Representatives has the power of impeachment, and the Senate the right to try impeachments

Judiciary—The courts of the State include a supreme court, a court of appeals, superior courts, courts of ordinary, justices of the peace, etc The supreme court is composed of a chief justice and five associate justices, and a majority of the court constitutes a quorum These justices are elected by the people and hold office for six years The court of appeals is composed of three members, also elected by the people and holding office for six years The superior court includes one judge for each judicial circuit The term of office is four years, and the judges are elected by the people The superior courts have exclusive jurisdiction in divorce, in criminal cases where the offender is subject to the death penalty, in cases affecting titles to land, and in equity cases There is an attorney-general for the State, and solicitors-general for each judicial circuit

Suffrage and Elections—The Legislature of 1907 enacted an amended suffrage law which had the effect of practically eliminating the negro vote in the State This measure required a two-thirds majority of the popular vote to ratify it, and this it received in the autumn of 1908 The measure provided first for educational qualifications Any male person of lawful age who has paid his poll tax may register and vote if he can read accurately or write accurately from dictation a paragraph of the Constitution of the United States or of the State constitution As a large percentage of negroes in Georgia are illiterate, this resulted in barring a great number of them from the ballot box In order, however, that this provision might not disfranchise white as well as colored persons, there was provided, as an alternative to the education qualification, a property qualification by which any person owning or paying taxes on $500 worth of property may register and vote, whether illiterate or not As a further safeguard to white voters, provision was made that any person who fought in any of the wars of the United States or of the Confederate States, or a descendant of any such person, may register and vote, such registration to be made before the year 1911, and any person so registering is entitled to vote thereafter without complying with the educational requirements of the suffrage law Finally, there was a blanket provision which gives the registrars of elections discretion in admitting any applicant for registration who is of good character and understands the duties of citizenship The Legislature of 1909 passed measures further amending the election laws and providing additional regulations for primary elections and for the registration of voters Contributions by corporations for election purposes were prohibited State officers and representatives to Congress are nominated at primary elections The Legislature of 1913 passed laws providing for the election of United States senators under the provisions of the Seventeenth Amendment

Other Constitutional and Statutory Provisions—The legal rate of interest is 7 per cent

and the rate allowed by contract is 8 per cent Judgments become outlawed in seven years, notes in six years, and open accounts in four years The chief causes for divorce are cruel treatment, habitual intoxication, willful desertion for three years, and conviction for offense involving moral turpitude, carrying a sentence of two years or longer The sale of certain narcotic drugs is prohibited Pensions are provided for ex-Confederate soldiers and widows The Legislature of 1911 created a department of fish and game and also a department of commerce and labor The same Legislature passed a measure creating an insurance department On Jan 1, 1908, a State-wide prohibition law went into effect See *History*, below

History. Georgia was originally part of the vast domain of the Cherokee and Creek Indians, themselves the successors of a superior race, whose ruined mounds still exist De Soto, in 1540, penetrated its interior, and Ribault, in 1562, visited its coast Though the region was included in the grant to the Carolina proprietors, the English did not occupy it, and their claim was denied by the Spanish, who had already worked its mines In June, 1717, the tract between the Savannah and Altamaha rivers, extending westward to the Pacific Ocean, was granted to Sir Robert Montgomery to be held as a distinct province under the title of the Margravate of Azilia As it was not settled in the time required, it lapsed to the proprietors, from whom the British government purchased, in 1730, seven-eighths of the territory, which it ceded by the charter of June 8, 1732, to a body of trustees organized for the purpose of "establishing the Colony of Georgia in America" Before this—February, 1732—the remaining one-eighth had been acquired from Lord Carteret Chief among the trustees was Gen James Oglethorpe, who desired to found an asylum for the poor debtors of England and for the Protestant refugees of Europe. The government desired to defend the Carolinas against the Spanish and Indians of Florida and to divert from the Spanish and French their trade with the Cherokees The Colony was the only one of the original thirteen to receive aid from the British government Oglethorpe landed at Charleston, Jan 13, 1733, and after negotiations with the Creek Indians took up land on the site of Savannah, February 13 The rules for the Colony required land to be held in tail male and on military service The introduction of rum and of slaves was forbidden In 1733, 50 Jewish colonists arrived, and these were followed in 1734 by Lutheran refugees from Germany (Salzburgers) In 1736 a colony of Highlanders arrived, and with them John and Charles Wesley, whose strict religious discipline made them unpopular and shortly led to their return to England In 1738 George Whitefield founded the orphanage of Bethesda, near Savannah Though generously aided, the Colony did not flourish The system of land tenures was oppressive, the scarcity of servants hindered agriculture, and the absence of restrictions in South Carolina drew many settlers there. In 1738 many colonists petitioned for the introduction of slavery In 1740 Oglethorpe led the troops of Carolina and Georgia in an invasion of Florida, and in 1742, by his strategy, drove off a Spanish fleet that attacked the forts on the Altamaha Slavery was introduced in 1749, the system of land tenure was changed in 1750, and the first Provincial Assembly met at Savannah in January, 1751 In 1752 the charter was surrendered, and Georgia became a royal province In 1753 the first General Assembly met at Savannah

Well governed and generously treated by Parliament, Georgia had little cause to aspire after independence, but St John's Parish sent a delegate to the second Continental Congress in March, 1775, and its example was followed by the other parishes In 1778 the British captured Savannah and in 1779 Augusta and Sunbury An attempt by the Americans and French to retake Savannah was unsuccessful (October, 1779), and it was held by the enemy till 1782 The first State constitution was framed in February, 1777, and on Jan 2, 1788, the Federal Constitution was ratified A second State constitution was adopted in 1789, and a third in 1798, when the importation of slaves was forbidden, and the boundaries of the State were defined as extending to the Mississippi on the west and the St Mary's River on the south The capital was moved to Louisville in 1795 and to Milledgeville in 1807 The enmity of the Indians had been aroused early in the history of Georgia, from 1783 to 1790 there were troubles with the Creeks and the Cherokees, and from 1790 to 1835 the lust for Indian lands was the chief force that shaped politics In 1802 the State ceded its territory west of the Chattahoochee to the United States in return for $1,250,000 and the promise that the Federal government would undertake to extinguish peaceably all Indian titles within the State of Georgia. Large cessions were made by the Creeks to the United States in 1814, after they had been defeated in a sanguinary war, and the territory of the lower Cherokees was acquired in 1817 In 1825 the Creek Indians relinquished to the United States all their lands within the limits of Georgia, and Governor Troup, proceeding on the theory that the inherent title of the Commonwealth in the land had thus been freed from all incumbrance, ordered the survey of the relinquished territory The Indians, however, repudiated their agreement on the ground of fraud, and this led to a conflict between the Governor and the national administration (1826), in which the State successfully defied the power of the general government After the same manner the Georgia Legislature in 1827 extended the criminal jurisdiction of the State over a part of the lands held by the Cherokees, thus asserting the incompatibility of an Indian commonwealth existing within the limits of the State with the sovereign power of that State The Supreme Court, in 1832, declared all such laws void, but its decision was disregarded by the State authorities The Creeks were expelled in 1832, and in 1835 the Cherokees ceded to the United States all of the disputed territory, removing from the State in 1838

The Whig party was always strong in Georgia, and when the secession movement broke out there was a powerful Unionist element in the State The radical party, however, prevailed, and, on Jan 19, 1861, a convention passed an ordinance of secession by 208 votes against 89 During the war the State bore more than its share of misfortune (For military operations in Georgia, see CIVIL WAR) Great commercial depression was followed by actual destitution In 1863 there was want in northern Georgia, and in 1864 the northwestern part

of the State was laid waste, and scores of thousands were living on government bounty At the end of the war it was estimated that four-fifths of the public wealth had been destroyed. The State was under military rule until June, 1865. On October 30 a convention of delegates at Milledgeville repealed the ordinance of secession, on November 7 the war debt of the State was repudiated, and a new constitution adopted, and on December 5 the Legislature ratified the Thirteenth Amendment In 1866, however, the Legislature refused to ratify the Fourteenth Amendment, and by the reconstruction acts of March, 1867, Georgia came once more under military rule A constitutional convention assembled in December, 1867, and in April 25, 1868, a new constitution was adopted by popular vote The Legislature chosen at the same time complied with the demands of the reconstruction acts and elected United States senators In July General Meade declared civil government restored, but as the Legislature afterward expelled its colored members on the ground of ineligibility and failed to ratify the Fifteenth Amendment (1869), the State was again excluded from Congress, and again subjected to military rule, under which the expelled negroes were reseated, and the Fourteenth and Fifteenth amendments ratified (February, 1870) Georgia's representatives in Congress were not admitted till January, 1871 During this period trouble was caused by the Ku-Klux Klan (q v)

Business activity recommenced immediately after the war, and, owing to its splendid resources, the State prospered in spite of a long period of misgovernment Under the wasteful administration of Rufus B Bullock, Governor from 1868 to 1871, the public debt was increased from $5,000,000 to $16,000,000, the larger part of this debt was contracted through the fraudulent indorsement of railroad bonds, which the State later repudiated Before 1880 charges of embezzlement were frequently brought against public officials, in particular against the State treasurers Legislation during the period was concerned in great measure with railway affairs, the railroads for the most part being under government control After 1880 economic development became especially marked as manufactures of cotton, iron, steel, and oil spread over the northern part of the State, and the mining of coal grew to large proportions The Cotton Exposition of 1881 and the Cotton States and International Exposition of 1898, both held at Atlanta, testified to the prosperity of the State. The division of races continued clean-cut, and though there was no disposition among the better class of whites to hinder the negro in the exercise of his civil rights, political equality was begrudged him, and social equality absolutely denied. In 1891 the Legislature decreed that separate public conveyances be provided for whites and for negroes, and in 1897 the appointment of a negro as postmaster was made impossible by public opinion.

In national politics the State was Democratic throughout the nineteenth century, except in 1840 and 1848, when it cast its electoral vote for the Whig candidate. In State politics Georgia, since 1874, has been uniformly Democratic, the Republicans having scarcely participated in most of the State elections From 1890 to 1898 the Populist party was powerful in the State, and this influence was continued when in 1904 the People's party nominated Thomas E Watson, a former Congressman from Georgia, for President In the first decade of the twentieth century the Democratic party was divided by dissensions caused by differences on State and local questions Hoke Smith, formerly Secretary of the Interior in President Cleveland's cabinet, was elected Governor in 1906 The Governor takes his seat when the Legislature convenes in the year following the year of his election, and Mr Smith became Governor on July 1, 1907 On August 6 of that year he signed a prohibition bill which forbade the sale of liquor in the State after Jan 1, 1908 There was much opposition to the enforcement of this law, especially in Atlanta, where efforts were made to secure injunctions to prevent its enforcement These, however, failed Governor Smith was elected on a platform which promised drastic reforms in the operation of railways in the State The Legislature in 1907 increased the State Railroad Commission to five members instead of three, with the object of securing a majority of members who were not dominated by railroad interests The Legislature passed severe measures affecting railways, and the attempted enforcement of these led to a conflict between State and Federal authorities (For a discussion of this, see STATE RIGHTS) The measure providing for the elimination of the negro vote, which Governor Smith strongly supported, is noted above in the section *Government* On July 9, 1907, Augustus O Bacon was unanimously reelected to the United States Senate Primary elections were held on June 3, 1908, to nominate candidates for Governor. Governor Smith was a candidate for renomination, but was defeated by Joseph M Brown The defeat of Governor Smith was generally attributed to his policy in the enforcement of the prohibition law, to the opposition of the business and railroad interests of the State, to his attitude on other State questions, and to the panic of 1907. Mr Brown had been a member of the State Railroad Commission and had been dismissed by Governor Smith In the national election held on Nov 3, 1908, William J Bryan received 72,350 votes, William H Taft 41,692, and Thomas E Watson (Populist) 16,965 In the vote for President the Republicans showed an increase of about 50 per cent in the number of votes cast, compared with those cast in 1904 Governor Brown was inaugurated on June 26, 1909, and on July 6 of that year Alexander S Clay was unanimously reelected to the United States Senate In the Democratic primaries for the nomination of Governor held on Aug 23, 1910, Mr Smith defeated Governor Brown for the renomination The issues in this campaign chiefly related to proposed amendments to the law disfranchising negroes Governor Brown favored the repeal of certain provisions of this law On the same date primaries were held for Representative to Congress, and a notable result was the defeat of Congressman L F Livingston, one of the oldest members of the House in point of service. His defeat was attributed to the fact that he had supported Speaker Cannon in the fight on the rules in the House contrary to the wishes of his party in the State The State election held on October 5 resulted in a decisive victory for Mr Smith At this election three constitutional amendments were adopted Senator Clay died on Nov 13, 1910, and Governor Brown appointed Joseph M. Terrell, a former

governor, to fill out the unexpired term Mr Smith was inaugurated Governor on July 1, 1911, and on July 12 he was elected United States Senator to succeed Senator Clay This brought about a unique situation Mr Smith was desirous of carrying into effect several important measures as Governor, but on his (Smith's) election to the Senate Mr Terrell resigned He held that his office ended automatically with the election of Governor Smith, but tendered his resignation in order to remove all doubt Governor Smith refused to accept the resignation, holding that Mr Terrell was still Senator until he (Governor Smith) qualified, and that he had no intention of so doing until the session of the Legislature came to an end Senator Terrell refused to serve, and indeed, as he had been stricken with paralysis, was physically unable to return to Washington During the remainder of this session of Congress, therefore, Georgia had a single representative in the Senate On the convening of the Sixty-second Congress Governor Smith was sworn in as Senator The election of Governor Smith to the Senate made it necessary to hold another election for Governor Joseph M Brown was again a candidate, and in the primaries held on Dec 7, 1911, he was successful He was inaugurated on Jan 25, 1912 A presidential primary election was held by the Democrats in May, 1912 Underwood received 71,410 votes, and Wilson 57,267 On August 21 of that year John M Slaton was nominated for Governor for the term beginning July 1, 1913 In the same primary Senator Bacon was renominated At the national election held on Nov 5, 1912, Wilson received 93,171 votes, Roosevelt 22,010, Taft 5190, and Debs 1014 The Democrats elected all the Representatives in Congress (For an account of the serious railroad strikes occurring in this year, see STRIKES) Senator Bacon died on Feb 14, 1914, and Governor Slaton appointed W S West to serve until the election of his successor The State has 12 Representatives in Congress Prior to 1910 it had 11

COLONIAL GOVERNORS

John Reynolds	1754–57
Henry Ellis	1757–60
James Wright	1760–76
Archibald Bulloch (President of Georgia)	1776–77
Button Gwinnett " "	1777

STATE GOVERNORS

John A Truetlen	1777–78
John Houston	1778–79
John Martin	1782
Lyman Hall	1783
John Houston	1784
Samuel Elbert	1785
Edward Telfair	1786
George Matthews	1787
George Handley	1788

UNDER FEDERAL CONSTITUTION

George Walton	Democratic-Republican	1789–90
Edward Telfair	" "	1790–93
George Matthews	" "	1793–96
Jared Irwin	" "	1796–98
James Jackson	" "	1798–1801
David Emanuel	" "	1801
Josiah Tattnall	" "	1801–02
John Milledge	" "	1802–06
Jared Irwin	" "	1806–09
David B Mitchell	" "	1809–13
Peter Early	" "	1813–15
David B Mitchell	" "	1815–17
William Rabun	" "	1817–19
Matthew Talbot	" "	1819
John Clark	" "	1819–23
George M Troup	" "	1823–27
John Forsyth	" "	1827–29
George R Gilmer	National Republican (later Whig)	1829–31
Wilson Lumpkin	Democrat	1831–35
William Schley	"	1835–37
George R Gilmer	Whig	1837–39
Charles J Macdonald	Democrat	1839–43
George W Crawford	"	1843–47
George W B Towns	"	1847–51
Howell Cobb	"	1851–53
Herschel V Johnson	"	1853–57
Joseph E Brown	"	1857–65
James Johnson	"	1865
Charles J Jenkins	"	1865–67
Gen T H Ruger	Military	1867–68
Rufus B Bullock	Republican	1868–71
Benjamin Conley	"	1871–72
James M Smith	Democrat	1872–77
Alfred H Colquitt	"	1877–82
Alexander H Stephens	"	1882–83
Henry D McDaniel	"	1883–86
John B Gordon	"	1886–90
William J Northen	"	1890–94
William Y Atkinson	"	1894–99
Allen D Candler	"	1899–1903
Joseph M Terrell	"	1903–07
Hoke Smith	"	1907–09
Joseph M Brown	"	1909–11
Hoke Smith	"	(July 1–Nov 15) 1911
Joseph M Brown	"	1911–13
John M Slaton	"	1913–15
N E Harris	"	1915–17
Hugh M Dorsey	"	1917–21
Thomas W Hardwick	"	1921–

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GEORGIA, STRAIT OF GULF OF. The main section of the arm of the north Pacific Ocean which separates Vancouver Island from the mainland It lies between Vancouver on the west and British Columbia on the east (Map British Columbia, D 5) It averages perhaps 25 miles in width and 250 miles long and is comparatively deep, having soundings of over 1000 feet It receives the water of the Fraser River (q v) and some smaller streams and communicates with the open ocean by Queen Charlotte Sound in the north and by the Strait of Juan de Fuca in the south

GEORGIA, UNIVERSITY OF An institution of higher education, chartered in 1785 and formally opened at Athens, Ga, in 1801 Its government is vested in a board of trustees appointed by the Governor At the outbreak of the Civil War the faculty and most of the students joined the Confederate army, and the institution remained closed until 1866 The proceeds of the sales of lands received by Georgia under the United States Land Grant Act of 1862 were transferred to the university in 1872, and the university, which in its inception was designed as a classical school, has, since the close of the Civil War, broadened its scope and

in 1914 comprised Franklin College, the State College of Agriculture, the Graduate School, the Law Department, the Pharmacy Department, the North Georgia Agricultural College, at Dahlonega, the Medical College, at Augusta, the School of Technology, at Atlanta, the Normal and Industrial School for Girls, at Milledgeville, the State Normal School, at Athens, the South Georgia State Normal College, at Valdosta, and the Industrial College for Colored Youths, at Savannah, which includes a well-equipped trade department The total attendance, including 677 preparatory students, in 1914 was 4864 The library contains about 45,000 volumes, and the university owns 18 buildings At Athens the running expenses of the university are partly defrayed by an annual State grant of $52,500 The chancellor in 1914 was D C Barrow, LL D

GEORGIA BARK See PINCKNEYA

GEORGIA HAMSTER. See GOPHER

GEORGIAN, or IBERIAN, or GRUSINIAN LANGUAGE The principal language of the Caucasian group of dialects This family of languages is divided into North and South Caucasian—the former group comprising Abkhasish, Avarish, Kasikumuk or Lak, Arkish, Hurkanish, Kurinish, Udish, Tchetchentsish, and Thuhish, and the latter division consisting of Georgian itself, Mingrelish, Lazish, and Suanish The Caucasian languages, which are, broadly speaking, agglutinative in type, although they show inflection in many instances, are comparatively poor in vowels, but they abound in difficult combinations of consonants, especially of gutturals and sibilants The noun and the verb are highly complicated, and the North Caucasian distinguishes in gender between the six categories of animate and inanimate, rational and irrational, masculine and feminine The number system in most of the dialects is vigesimal The Georgian is the only Caucasian dialect that has developed a literature, it begins with a translation of the Bible in the eighth century, though some authorities maintain that there was a version made as early as the fifth century This literature, within a modified Armenian script, is quite considerable in extent and includes poetry, romance, history, and theology Among the more important works are the epics *Baramiani* and *Rostomiani*, and the prose romances *Visramiani* and *Darejaniani*—the former by Sarg of Thmogvi and the latter by Mosi of Khoni The Georgian literature reached its highest development during the seventeenth and eighteenth centuries

Bibliography The best general outline of the Caucasian languages, including Georgian, is that of Friedrich Muller in *Grundriss der Sprachwissenschaft*, vol iii, sec 2 (Vienna, 1887) Consult also. Erckert, *Die Sprachen des kaukasischen Stammes* (Vienna, 1895), Brosset, *Eléments de la grammaire géorgienne* (Paris, 1836), *Dictionnaire géorgien-russe-français* (St Petersburg, 1840), Leist, *Georgische Dichter verdeutscht* (2d ed, Leipzig, 1900), id, *Das georgische Volk* (Dresden, 1903), Bork, *Beiträge zur kaukasischen Sprachwissenschaft* (Königsberg, 1907), Th. Kluge, "Studien zur vergleichenden Sprachwissenschaft der kaukasischen Sprachen," in vol xii of *Vorderasiatische Gesellschaft Mitteilungen* (Berlin, 1907); Dirr, *Ueber die Klassen (Geschlechten) in den kaukasischen Sprachen* (Leiden, 1908)

GEORGIAN (jôr'jan) **ARCHITECTURE** The style of architecture in England prevailing during the reigns of the four Georges (but especially of the first three, 1715–1820), and corresponding to the Colonial style in the United States It was a development from the Italian or Palladian style, introduced by Inigo Jones, in the direction of special adaptation to English requirements, in which it lost much of the distinctive quality of the Italian prototype, but gained, on the other hand, in freedom and picturesqueness of detail and never fell into the extravagances and bad taste of much of the contemporary Italian work Hawksmoor, James Gibbs (who designed St Martin's-in-the-Fields, London), Colin Campbell, the Adam brothers, Sir William Chambers (architect of Somerset House, London), Robert Taylor, and George Dance, are among the most notable architects of this period The style was especially successful in domestic architecture and interior decoration and was the natural and logical source of inspiration for American Colonial design To the churches of Wren (q v) and Gibbs (q v) especially, American architecture owes the models of many churches built between 1750 and 1820 The Georgian style disappeared during the period of artistic dearth of the early nineteenth century in England, to be followed by the Gothic and Greek revivals Consult A E Richardson, *Monumental Classic Architecture in Great Britain and Ireland* (London, 1914), F E Wallis, *The Georgian Period* (3 vols, Boston, 1898–1902), G H Polley, *The Architecture and Furniture of the American Colonies during the Eighteenth Century* (2 vols, ib, 1914).

GEORGIAN BAY An eastern extension of Lake Huron in the Province of Ontario, Canada, about 120 miles long and 50 miles wide, and with depths exceeding 300 feet in the southwest section (Map· Ontario, C and D 3) It contains thousands of islands, the largest of which, Grand Manitoulin, partly separates it from Lake Huron The entrance to the bay is by a channel, 20 miles wide, south of this island

GEORGIANS The Georgians, or Kartvelians, form the southern group of peoples of the Caucasus, which includes the following stocks, whose languages appear, though in part only distantly related, to have had a common origin (1) the Georgians proper, or Grusians, with the Khevsurs, Thushes, Pshavs, and other mountain tribes, the Imers, the Gurians, etc. (2) the Mingrelians, with the Lazes, Abkhasians, etc, (3) the Suanitians, or Swans, of Kutais Physically the Georgian peoples are of the white, not the yellow, race, but rather mixed, the Georgians proper being brachycephalic, the Imers and Mingrelians more or less dolichocephalic, the Imers, too, have a less oval face, but Pantiukhoff (1893) considers them to represent best the primitive Georgian race, while Ripley (1899) takes the Mingrelian as typical of this group The physical beauty of the men and women of the Georgians proper has long been famous, but Chantre (1885) and after him Ripley style it "a perfectly formal, cold, and unintelligent beauty, in no wise expressive of character" Like the Circassians, the Georgians furnished slaves and women for the harems of Turkey, Egypt, etc The ugliest and most degenerate representatives of the group are to be found among the Suanitians, with whom goitre and cretinism prevail to a considerable extent The Georgians have resided in their present habitat 4000–5000 years, and the human remains found

in the caves of Kutais suggest a longer period for man's existence in this region Some authorities, however, think that at the time of their appearance here the primitive Georgians were already somewhat cultured by earlier residence farther south in contact with ancient Aryan or Semitic civilizations in Asia Minor Later on the Georgians seem to have furnished copper, antimony, etc, to these same civilized centres Some hold that the primitive inhabitants of the region about Lake Van (the authors of the Vannic inscriptions and the possessors of a certain amount of indigenous culture) and the so-called Mitani were of the Georgian stock The Georgians proper are the best-known sections of the group Russian intermixture appears to have stimulated to a certain degree the poetical and general literary genius of this people Besides the material about the Georgians in Von Erckert's *Der Kaukasus und seine Volker* (Leipzig, 1887), and Chantre's *Recherches anthropologiques dans le Caucase* (4 vols, Lyons, 1885–87), reference may be made to Leist's *Georgische Dichter verdeutscht* (Leipzig, 1887), Wardrop's *The Kingdom of Georgia* (London, 1888), Leist's *Georgien Natur, Sitten und Bewohner* (Leipzig, 1885), etc

GEORGIAN SERIES. See CAMBRIAN SYSTEM

GEORGIAN VERSION. See BIBLE

GEORGIA SCHOOL OF TECHNOLOGY An institution for scientific education, founded in 1888 at Atlanta, Ga It forms a part of the University of Georgia The special features of the school include a hospital with a medical corps which cares for the physical welfare of the students, a Y M C A building, the centre of student life, in which two secretaries are employed, and an athletic field for the physical development of the students The school has one of the best equipments for electrical, mechanical, and civil experimental laboratories in the South Being in the centre of the industrial South, the students have the advantage of inspection in the plants of various manufacturers The total number of students in all departments of the school in 1914 was 1002, and of these 712 were in the academic department The instructors numbered 62 The school has no endowment, and the value of the college grounds and buildings in 1914 was about $750,000 The annual income amounts to about $140,000 The library contains about 13,000 volumes The president in 1914 was Kenneth J Matheson, A M

GEORGICS, jôr'jĭks A didactic poem by Vergil (q v), begun at the suggestion of Mæcenas and dedicated to him It is an agricultural work in four books, one of the most important of the writings of the Geoponici (q v) The first book treats of the cultivation of the fields, the second of trees, the third of horses and cattle, and the fourth of bees Around these subjects Vergil collected all the experience of the old Italians and associated them with great beauty of style and illustration The poem is in hexameters and represents the poet's most perfect work in versification It was composed between 37 and 30 B C Consult. Sellar, *Virgil* (2d ed, Oxford, 1883), Glover, *Studies in Virgil* (2d ed, New York, 1912), Royds, *The Beasts, Birds, and Bees of Virgil* (Oxford, 1914)

GEOSYNCLINE, jē'ō-sĭn'klīn. The name given to a great trough-shaped fold in the earth's crust, similar to a syncline (q v), but of larger amplitude and affecting the strata to profound depths The name was introduced by J D Dana, who inferred the existence of such structural depressions from the extensive development of sedimentary strata in some of the present mountain ranges The Appalachians, e g, involve 40,000 feet of Paleozoic rocks, the Rocky Mountains 60,000 feet or more of sediments, and the Alps and Himalayas exhibit equally extensive deposits Accumulations in continuous series of this kind lead to the inference that they were laid down on a subsiding sea bottom, the underlying platform gradually yielding by flexure to the load As the area of sedimentation is always close to the shore line, the depression must have the form of a long narrow trough The period of subsidence may be terminated finally by a crustal movement in the reverse direction which leads to folded mountains, the geosyncline marking a zone of weakness along which the crustal stresses find relief

GE'OTEU'THIS (Neo-Lat, from Gk γῆ, *gē*, earth + τευθίς, *teuthis*, cuttlefish) A fossil cuttlefish bone, found in the Upper Liassic beds of England, Germany, and France Its form is that of a flat, thin wedge Its chief interest lies in its frequent association with the petrified ink bag of the same animal This ink bag has been hardened to a glistening black mass, which can be dissolved and used for water-color drawing in much the same manner as is the modern sepia See CEPHALOPODA, CUTTLEFISH, SEPIA, SQUID

GEOTROPISM IN ANIMALS See TROPISM

GEOTROPISM (jē-ŏt'rō-pĭz'm) **IN PLANTS** (from Gk γῆ, *gē*, earth + τροπή, *tropē*, a turning, from τρέπειν, *trepein*, to turn) The sensitiveness of plant organs to gravity The attraction of the earth acts as a stimulus to which the organ responds in a manner comparable to that exhibited in heliotropism, chemotropism, etc Different organs respond to this stimulus in different ways Primary roots (i e, those originating from the embryo itself) are positively geotropic They normally grow with their tips directed towards the centre of the earth If placed in any other position, they bend so

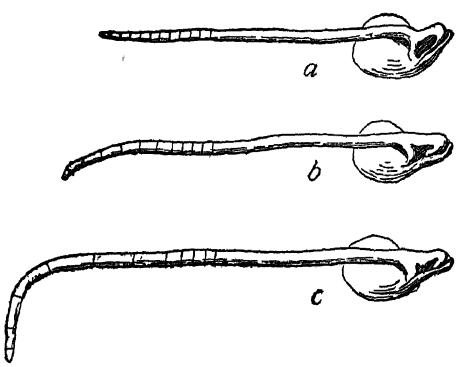

FIG 1 POSITIVE GEOTROPISM

Root of pea *a*, with terminal portion marked into zones 1 millimeter long and laid horizontal, *b*, the same after six hours, *c*, the same after 24 hours The third to seventh zones have grown most in length The curvature is not usually so sharp, but all growing zones bend.

that the axis of the growing portion regains its normal direction In these organs the receptive (or perceptive) region is in the extreme tip,

while the active or curving region lies 2 or 3 millimeters back of the tip. The attraction of gravity sets up a disturbance (the nature of which is not yet certainly known) in the receptive region, and this is propagated backward

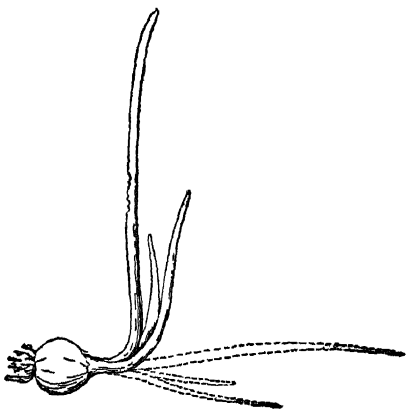

FIG 2 NEGATIVE GEOTROPISM

Radical leaves of onion with basal growth, which have erected themselves from the horizontal, because growth on underside is accelerated by gravity

through the intervening cells to the region of curvature Here the disturbance causes an alteration in growth such that the side of the root directed upward grows more rapidly than the other side, thus producing a curvature which ultimately directs the tip downward again (Fig 1) Many other plant organs besides primary

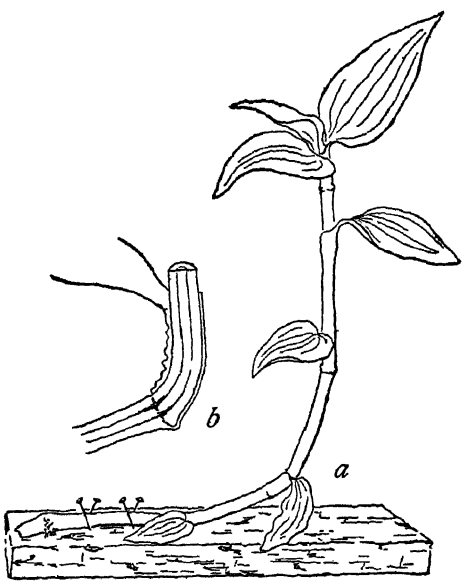

FIG 3 NEGATIVE GEOTROPISM

a, a shoot of *Tradescantia*, pinned to cork by lowest internode in a horizontal posture, has erected its tip, because the growth of the base of each internode has been accelerated by the stimulus of the gravity, *b*, a longitudinal section through the growing region of an internode after induced growth

roots are positively geotropic. Among these are the rhizoids (q v) of many lower plants, stalks of certain fruits and fruit clusters, many aërial roots, etc

The primary shoots of most plants are apogeotropic (negatively geotropic)—i e, they normally direct their tips away from the centre of the earth This kind of sensitiveness is called apogeotropism, or negative geotropism (Fig 2) In such organs the receptive region is not so well marked off from that of bending as in roots It may extend throughout the whole growing region Also any region where growth is taking place has the power of curving under this influence The response is similar to that in roots, but in shoots the region where growth is accelerated is on the underside when placed horizontal In certain regions where growth has ceased it may be renewed under the influence of geotropic stimulation, and curvature may then ensue Examples of this are found in the mature joints of grass stems, also in those of the common Wandering Jew (*Tradescantia*) These bend sharply when placed horizontal, in which position they are stimulated by gravity (Fig 3).

Many organs, such as ordinary foliage leaves, lateral branches, lateral roots, rhizomes, runners, etc, usually show another form of response to this stimulus Their normal position is horizontal, and, if displaced, they return to this position by bending This tendency is dependent on diageotropism The stalks of certain flowers, such as those of narcissus and pansy, are diageotropic, so that the flower faces laterally In dorsiventral organs, e g, many leaves, diageotropic response may consist of two movements —a curvature which results in bringing the main axis into the horizontal plane, and a torsion of the whole organ which brings its two surfaces into their normal relation to the surface of the earth

Still another form of geotropic curvature is shown by the growing regions of twiners, like the hop (Fig 4), morning glory, and bean If the tip of the stem of such a plant be directed upward, gravity will exert an influence upon it which results in the acceleration of growth along one side This produces a lateral nodding But as soon as the tip begins to nod, the region of accelerated growth migrates to the flank The apex is thereby swung to the right or left, describing an irregular circle, clockwise or counterclockwise, according to the plant. What determines these directions is not known It differs among species of the same family or the same genus, and in some cases even in the plants of the same species The tendency to respond is termed lateral geotropism, and it is on account of this property that such plants are enabled to twine about a support.

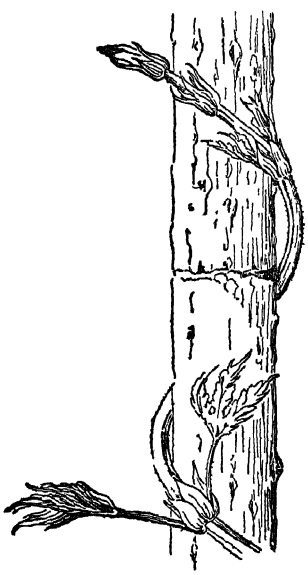

FIG 4 LATERAL GEOTROPISM

Tip of a twiner, the hop vine, showing low coils first formed, and the retarded development of the upper leaves After *Kerner*.

All geotropically sensitive organs may be constrained to grow in a horizontal direction, in spite of the stimulus of gravity, if they are slowly rotated on a horizontal axis by means of a clinostat (q v) In order to produce bending the stimulus must affect the organ in a one-sided manner When a plant is rotated on the clinostat, all parts are successively directed towards the centre of the earth, for equal periods of time Hence there is as much tendency to bend in one direction as in another, and the resultant growth is uniformly accelerated on all sides

Geotropism only in part determines the final position of subterranean plant organs Hydrotropism, chemotropism, traumotropism, etc, all have their effect, and the final position is the resultant of all these reactions The position of aerial organs is determined largely by geotropism and heliotropism (q v) It is difficult to analyze any response and tell to what factor it is due This can be done best by the use of the clinostat, varying the position of the axis according to the needs of the experiment See also APOGEOTROPISM, DIAGEOTROPISM.

GEPHYREA, jĕ-fīr'ē-a (Neo-Lat nom pl, from Gk *γέφυρα, gephyra,* bridge) A class of Annulata, containing certain marine worms devoid of segmentation in the adult condition, and the larvæ of which are typical trochospheres The class includes *Sipunculus, Echinus, Bonellia,* and a few other forms

GEPIDÆ, jĕp'ĭ-dē A people of Gothic affinities, who in the third century lived on the shores of the Baltic, near the river Vistula According to legend, they advanced southward with the Goths and established themselves in what is now the western part of Hungary They were subjugated by Attila (q v), but after his death rose and drove out the Huns They were defeated by Theodoric the Ostrogoth King in 488 and in 566 or 567 they were conquered by the Lombards After this the name disappeared, the remnants of the nation being swallowed up by the Avars Consult Hodgkin, *Italy and her Invaders,* vols i–v (London, 1885–95)

GEPPERT, gĕp'pērt, KARL EDUARD (1811–81). A German classical scholar He was born at Stettin and was educated at Breslau, Leipzig, and Berlin, where he was professor from 1846 until his death His works include *Ueber die Aussprache des Lateinischen im altern Drama* (1858), *Ueber den Ursprung der Homerischen Gesange* (1840), a polemic directed against Ritschl, *Die altgriechische Buhne* (1843), and editions of plays of Plautus (q v)—the *Captivi* (1859), the *Truculentus* (1863), the *Pœnulus* (1864), the *Epidicus* (1865), and the *Casina* (1866), and editions of other classics His researches concerning the Roman stage, especially the plays of Plautus, are valuable, and several public performances of the comedies *Trinummus, Menæchmi,* and *Rudens* were organized by him

GERA, gā'ra (OHG *Geraha*) The capital of the German Principality of Reuss (younger branch), situated on the White Elster about 44 miles east-southeast of Weimar (Map Germany, E 3) It is well laid out, having been almost entirely rebuilt since a fire in 1780 The old houses are very conspicuous, and many of them have cellars cut into the rock One of the oldest and most prominent buildings is the Rathaus, erected in 1573–76, on the site of the old thirteenth-century building The churches are of comparatively recent construction. The palace of the prince, the theatre, and the post office are noteworthy buildings Gera has a gymnasium, a trade school, and a textile school, also a library with 19,000 volumes The manufacture of woolens, introduced from Flanders at the end of the sixteenth century, is important, amounting to more than $14,000,000 annually Much is exported to the United States Other manufactures are carpets, carded wool, leather, dyestuffs, castings, gloves, sewing machines, books, lithographed work, harmonicas, machinery, brick, leather, tobacco, jewelry It has large nurseries There is also an extensive trade in oil, spirits, and drugs Pop, 1900, 45,640, 1910, 49,276, principally Protestants Gera is first mentioned under its present name in the twelfth century, when it belonged to the abbey of Quedlinburg It passed to the house of Reuss at the beginning of the fourteenth century

GERACE, jā-ra'chā A city in the Province of Reggio di Calabria, south Italy, 60 miles northeast of Reggio, beautifully situated near the Ionian Sea, on a slope of the Apennines (Map Italy, F 5) It consists of the lower town, or Marina, and the upper town, 1570 feet above sea level, and 5½ miles away from the Marina About 2 miles southwest of the Marina are the ruins of the ancient city Locri Epizephyrii (see LOCRIS), founded in 683 B C, famous for its laws, attributed to Zaleucus, and celebrated by Pindar and Demosthenes for its wealth and cultivation of art, the ruins are now concealed by an orange grove In the cathedral, which was rebuilt after the earthquake of 1783, are some ancient columns There are iron and coal mines, blast furnaces, and marble quarries, and the soil of the district is rich, producing grain, olives, and grapes, the last of exquisite quality Near by are a number of warm sulphur springs Pop (commune), 1901, 10,595, 1911, 11,009

GERAINT, ge-rānt' A knight in the Arthurian legends He appears in the *Mabinogion* romance, *Geraint the son of Erbin,* the source of which is Chrestien de Troyes's *Erec et Enide,* and in Tennyson's idyl *Geraint and Enid*

GER'ALD DE BAR'RI. See GIRALDUS DE BARRI

GERALDINE, jĕr'al-dĭn, THE FAIR The lady to whom the Earl of Surrey's sonnets are addressed, now identified with Lady Elizabeth Fitzgerald, daughter of the ninth Earl of Kildare, and, at the time the poems were begun (1537), only nine years old

GERALDINI, jā'ral-dē'nē, ALESSANDRO (1455–1525) The first Roman Catholic Bishop of Santo Domingo He was born at Amelia, Italy, was educated as a soldier, and in 1475–76 served with the Spanish army against Portugal In Spain he took holy orders, became a friend of Archbishop Mendoza, of Toledo, and by him was introduced to the court of Castile, where he became tutor to the royal princesses His influence at court is said to have obtained for Columbus his first interview with Ferdinand and Isabella He was engaged at various times on important diplomatic missions, both for the papacy and for Spain, and held in succession several Italian bishoprics In 1520 he became the first Bishop of Santo Domingo, where he lived for the remainder of his life and exerted his power and influence to make amends for the ruinous policy that had marked Spanish rule. He wrote a valuable narrative of his voyage to

America, and a description of Santo Domingo, in his *Itinerarium ad Regiones sub Equinoctiali Plaga Constitutas* (1631), and several religious treatises

GERANDO, Marie Joseph de. See Degerando

GERA'NIA'CEÆ See Geranium

GERA'NIUM (Lat, from Gk γέρανιον, *geranion*, crane's-bill, from γέρανος, *geranos*, crane). A genus of dicotyledonous plants, the type of the family Geraniaceæ, of which the most important genera are *Geranium*, *Pelargonium*, and *Erodium* The genus includes nearly 200 species, widely distributed in temperate regions, about

GERANIUM

70 species occurring in North America. A dozen species are indigenous to Great Britain, of which number the stinking crane's-bill, or herb Robert (*Geranium robertianum*), is a common weed It is a low, spreading herb, with deeply divided leaves and small flowers, and has been used medicinally as an astringent It is also found in parts of the United States Alum root (q v), a North American species, with flowers of considerable beauty, is the most valuable medicinally of all the species It is very astringent and abounds in tannin, a character which belongs to some extent to many species of the genus The common name, "crane's-bill," is given to many of the species of *Geranium*, on account of the long-beaked fruit, which in splitting aids in scattering the seeds *Geranium tuberosum*, of southern Europe, and *Geranium dissectum*, the wild carrot of Australia, produce edible tubers The species of *Geranium* are not extensively cultivated, the plants so widely grown under that name being species of the genus *Pelargonium*, of which there are about 200 species, natives of South Africa and Australia These plants are prized on account of the colors of the flowers and the shape and marking of the leaves Many hybrids have been produced, and there is hardly a better-known window plant. They are easily propagated by cuttings, requiring a light, rich soil and good drainage A number of species produce tuberous edible roots, as *Pelargonium triste*, of the Cape of Good Hope The leaves of *Pelargonium acetosum* and *Pelargonium peltatum* are acid and edible Two species of *Erodium* (*Erodium cicutarium* and *Erodium moschatum*, known as Alfilaria) occur abundantly over a large extent of the Pacific coast region, where they are considered valuable forage plants, since they spring up rapidly after rains and furnish excellent pasturage, and are readily eaten when green by all kinds of stock When dry, they become very brittle, and are of little value They seldom attain a height sufficient to admit of being cut for hay These two species have become naturalized in the eastern United States A related species (*Erodium cygnorium*) is considered one of the most valuable forage plants for the drier portions of Australia

GÉRARD, zhā'rar', Balthasar (1558–84) A French religious fanatic, born at Villafons, Franche-Comte Under the name of François Guion he entered the service of William of Orange, and on July 10, 1584, assassinated him as the Prince was leaving his palace at Delft Gérard was put to death by quartering two weeks later His family was ennobled by Philip II

GÉRARD, Cécile Jules Basile (1817–64) A French traveler, better known as "Gerard the Lion-Killer" His adventures in Algeria were chronicled in *La chasse aux lions* (1855) and *Gérard le tueur des lions* (1858) In 1863 he started on a tour of exploration in West Africa, where he was drowned in 1864.

GÉRARD, Conrad Alexandre (1729–90) A French diplomat, brother of Gérard de Rayneval (q v), born at Massevaux, Upper Alsace He entered the diplomatic service and served as secretary of the French Legation at Mannheim from 1753 to 1759, and Secretary of the French Embassy at Vienna from 1761 to 1766 In July, 1766, he was recalled to Paris to become Secretary of the Council of State and chief clerk in the Bureau of Foreign Affairs Early in 1778, under instructions from Vergennes, he conducted the negotiations with the American representatives, Franklin, Deane, and Lee, which resulted in the signing of the two treaties with the United States on Feb 6, 1778, by which France openly sided with the struggling Colonies In March, 1778, he sailed to America with D'Estaing's fleet, as the first accredited Minister from France to the United States This post he held until superseded by Luzerne in September, 1779 His activity in America consisted chiefly in subsidizing writers—of whom Thomas Paine was the best known—to create a sentiment favorable to a closer French alliance and in influencing members of Congress who received "gifts" from him His communications to Congress were mostly oral addresses delivered at secret sessions He received the degree of LL D from Yale, and on his return to France was made Councilor of State

GÉRARD, Etienne Maurice, Count (1773–1852) A marshal of France, born at Damvilliers, in Lorraine As a volunteer of 1792, he served under Dumouriez and Jourdan and after the Peace of Campo-Formio (1797) went to Vienna with Bernadotte as a colonel and became his chief of staff in 1805. His gallantry at Austerlitz (1805) and Jena (1806) made him brigadier general On the morning after Wagram (1809) he was made Baron of the Empire He fought in Spain and in Russia, and practically gained the victory at Bautzen (1813) for Napoleon, who made him Count and general of division During the campaigns of 1814 he com-

manded at La Rothière and Montereau After the First Restoration he was named Grand Cross of the Legion of Honor, and Chevalier of St Louis, and received various high appointments On the return of Napoleon from Elba, Gérard joined him and fought splendidly under Grouchy at Ligny (June 16, 1815) Had his advice been followed, Grouchy would have gone more quickly to the aid of Napoleon on the 18th of June, and Waterloo might have been averted Napoleon made him a peer of France just after his return After the Second Restoration Gérard was obliged to leave France and did not return till 1817 He was elected a member of the Chamber of Deputies in 1822–24 and reelected in 1827, took an active part in the revolution of 1830, and commanded the troops appointed to maintain order in Paris In the same year Louis Philippe appointed Gérard Minister of War, a post which he resigned soon after In the following year he was made marshal of France and given the command of the expedition to Belgium, in which he distinguished himself by taking Antwerp in December, 1832 In 1835 he succeeded Marshal Mortier as Grand Chancellor of the Legion of Honor In 1852, the year he died, he became a senator under the Empire

GÉRARD, François Pascal, Baron (1770–1837) A French historical and portrait painter He was born in Rome, March 4, 1770, and in 1782 came to Paris with his father, an employee of the French Ambassador in Rome He first studied sculpture under Pajou, but soon took up painting under Brenet and later under David (q v) and became one of his most famous pupils In 1789 he received the second Roman prize for his picture "Joseph Recognized by his Brothers" (Anger Museum) In 1795 his "Blind Belisarius," now at St Petersburg, attracted much attention Of his remaining classical subjects the best known are "Psyche Kissed by Cupid" (1798), in the Louvre, the "Three Ages" (1806), now in the Museum of Naples, "Homer" (1814), and "Daphnis and Chloe" (1824), also in the Louvre He also painted large historical canvases, among which are the "Battle of Austerlitz" (1810) and the "Entrance of Henry IV into Paris" (1817), in the Museum of Versailles Both of these paintings are well known through engravings The former was commissioned by Napoleon, who thought highly of Gérard; the latter brought him the title of Baron, and appointment as court painter to Louis XVIII He had been Chevalier of the Legion of Honor since the foundation of the order and a member of the Institute since 1812 Among his other famous paintings are the "Pestilence at Marseilles" (Marseilles) and the "Coronation of Charles X" (Versailles)

But none of these historical works rise much above the dead level of the Classical school Gérard is remembered now chiefly for his portraits of the celebrities of his day, with their rich backgrounds, which he reintroduced into art The earlier show strong characterization and sympathetic handling, but the later ones are theatrical and exaggerated The best are perhaps those of the painter Isabey and of his daughter (in the Louvre), of Mademoiselle Brogniart (Baron Pichon, Paris), and of Madame Recamier. He also painted portraits of Moreau, Talleyrand, Napoleon (Dresden), and two of Josephine, the Empress Marie Louise, and the King of Rome—300 in all Many of them are at Versailles He died in Paris, Jan 11, 1837. Consult his biography by Lenormant (Paris, 1846), Adam, *Les œuvres du Baron François Gérard* (ib, 1852–57), Henri Gérard, *Correspondance de François Gérard* (ib, 1867), and *Lettres adressées au Baron François Gérard* (ib, 1886), Muther, *History of Modern Painting* (New York, 1907)

GERARD, jĕ-rärd′, James Watson (1867–) An American jurist and diplomat He was born at Geneseo, N Y, and graduated from Columbia University in 1900 and from Columbia Law School in 1902 He was chairman of the Democratic campaign committee of New York County for four years, and served as major of the National Guard of the State of New York for four years From 1908 to 1911 he was associate justice of the Supreme Court of New York In 1913 he was appointed by President Wilson Ambassador to Germany In 1914 he was Democratic candidate for United States Senator from New York

GÉRARD, Jean Ignace Isadore. See Grandville

GERARD, jē-rärd′, John (1545–1612) An English herbalist and surgeon He was born at Nantwich, Cheshire, and after spending some time in traveling settled in London For more than 20 years he acted as superintendent of the gardens of Lord Burghley, Secretary of State to Queen Elizabeth, and had a considerable reputation as barber surgeon, becoming master of the company in 1608 In 1596 he published a catalogue of plants cultivated in his own garden, 1039 in number, inclusive of varieties of the same species The following year appeared his well-known *Herball*, an adaptation of the *Stirpium Historiæ Pemptades* of Rembert Dodoens (1583, 2d and 3d eds enlarged and improved, published by Thomas Johnson, 1633 and 1636) Linnæus named the genus *Gerardia* in honor of Gerard

GÉRARD, Rosemonde See Rostand, R G

GERARD DE NERVAL, zhā′rär′ de nâr′val′ The name adopted by Gérard Labrunie (1808–55), a French poet, dramatist, novelist, and miscellaneous writer, born in Paris. He was a conspicuous member of the famous Romantic *cénacle* of Victor Hugo and Théophile Gautier His translation of *Faust*, produced in 1828, gained Goethe's approval, and was in part adopted by Berlioz for his symphonic legend, *La damnation de Faust* His short stories, *Les illuminés* and *Contes et facéties* (1852), suggest a mind veiging on insanity, his *Scènes de la vie orientale* (1848–50) rank among the most brilliant pages in French of exotic and vividly imaginative description His *Le voyage en orient* (1889) has often been reprinted Gérard's *Works* were collected in five volumes (1868) He died by suicide Consult Tourneux (Paris, 1888) and Gauthier-Ferrières, *Gérard de Nerval* (ib, 1906)

GÉRARD DE RAYNEVAL, de rā′n′-val′, Joseph Mathias (1746–1812) A French diplomat, brother of Conrad Alexandre Gérard (q v), born at Massevaux, Upper Alsace. He entered the French diplomatic service in 1767 as chargé d'affaires at Ratisbon and was promoted to a similar position at Danzig in 1769 In 1782, while Franklin, Jay, and Adams were negotiating with the French and English representatives at Paris for the conclusion of peace in America, Vergennes secretly dispatched Gé-

rard de Rayneval to London to patch up difficulties between Spain and England The American commissioners got wind of the mission, and Jay and Adams became convinced that Vergennes was dealing falsely with them, and that he was arranging a secret treaty with England to restrict their western boundary, fishery rights, etc This belief led them to break off the three-cornered negotiations and, contrary to the instructions of Congress, to conclude a preliminary treaty of peace with the British representatives without further consultation with Vergennes. From 1783 to 1792 Gérard de Rayneval was Minister to England and conducted numerous negotiations during this critical period with great tact and ability He lived in retirement during the rest of the Revolution and after it engaged in journalism and the study of history and international law, on which he wrote several works of value, such as *Institutions du droit de la nature et des gens* (1803) Consult Masson, *Le département des affaires étrangères pendant la révolution* (Paris, 1877)

GÉRARDMER, zhā-rar'mâr' (Fr, Lake of Gérard, named in honor of Gérard of Alsace, who built a tower on the shore of the lake about 1070) A pretty mountain town, capital of a canton in the Department of Vosges, France, on the Gérardmer Lake, about 33 miles by rail from Epinal (Map· France, N, M 4) It has a large trade in the well-known "gerome" cheese, and has some manufactures of linen Owing to its picturesque position in the Vosges, it is well patronized as a summer resort and is the usual starting point of excursions into the mountains Pop, 1901, 9104, 1911, 10,421

GERARDO DALLE NOTTI, jā-rar'dō dal'lā nŏt'tē See HONTHORST, GERARD VAN.

GERARD THE GREAT. See GROOTE

GERARDUS MAGNUS. See GROOTE

GERARDY, zhe-rar'dē', JEAN (1877–). A Belgian violoncellist, born at Spa When only seven years of age, he began the study of the violoncello under Richard Bellmann In 1885 he entered the Conservatory at Verviers, where his progress was so phenomenal that he left the institution in 1888 as a finished virtuoso He made his début in the same year in London at a concert at which both Paderewski and Ysaye appeared Although a boy in years, his playing even then was that of a master With extraordinary success he then concertized in Belgium, Holland, Germany, France, and Russia. In 1899 he visited the United States for the first time, and here he appeared not only as a soloist, but also as an ensemble player with such artists as Ysaye, Kreisler, Hofmann, Marteau, and Godowsky While on his fifth visit to the States, during the season of 1913–14, the chamber music concerts given by the trio consisting of Gerardy, Ysaye, and Godowsky were among the notable events of the year.

GERASA, jĕr'ā-sa (Lat, from Gk Γέρασα) A city of Palestine in Roman times, situated among the mountains of Gilead, about 20 miles east of the Jordan, a like distance north of Philadelphia, 22 miles from Pella, and 6 miles north of the Jabbok It is now called Jerash and has been identified by Sir George Grove with Ramoth-gilead It is well watered by an unfailing stream which empties into the Jabbok Gerasa is first mentioned as having been captured about 83 B C. by Alexander Jannæus of the Maccabæan line It was rebuilt by the Romans in 65 B C Under Vespasian it was captured by Lucius Annius, plundered, and burned It was a member of the Decapolis (q v) and in the time of the Antonines (138–180 A D) was one of the most important cities of Syria In early Christian times it was the seat of a bishopric, but subsequently sank into decay The ruins are beautiful and extensive Great portions of the wall are in good preservation, and many columns are still standing on their pedestals There are remains of buildings and a triumphal arch Photographs of the ruins were published by the Palestine Exploration Fund in 1867 It is hardly possible to connect Jerash with the "country of the Gerasenes" mentioned in certain accounts as the scene of one of Christ's miracles See GERASENES, COUNTRY OF THE

GERASENES, gĕr'a-sēnz', COUNTRY OF THE The scene of the miracle of Jesus in connection with the legion of demons and the herd of swine (Matt viii 28–34, Mark v 1–20, Luke viii 26–39) The name of the people (American Standard Revised text) is variously given as "Gergesenes" in Matthew, and "Gadarenes" in Mark and Luke—the best readings, followed by the Revised Version, seeming to be "Gerasenes" in Mark and Luke and "Gadarenes" in Matthew "Gergesenes" in Matthew is possibly due to Origen's suggestion that it should be substituted for "Gerasenes," the town Gerasa being too far removed from the scene, while he knew of a town Gergesa on the eastern shore of the lake, to which he thought the name should be conformed It is of course impossible to refer the miracle to the neighborhood of Gerasa, the modern *Jerash* (See GERASA) The most probable identification is with the modern *Kersa*, or *Gersa*, a ruined village on the east side of the Sea of Galilee, directly opposite Magdala (*El-Mejdel*) and just south of the *Wâdy Es-Semak*. The topographical conditions of this locality, which are unique for the eastern shore, satisfy in a significant way the requirements of the narrative This town may have been popularly recognized as included in the larger district of Gadara, which was the principal city of that region If so, this would account for the reading "Gadarenes" in Mark and Luke

GERBA See JERBA

GERBER, gĕr'bēr, ERNST LUDWIG (1746–1819) A German musical lexicographer. He was born at Sondershausen, a son of Heinrich Nikolaus Gerber, court organist in that city After studying law at Leipzig he devoted himself more exclusively to music, and succeeded to his father's position in 1775 For 10 years he was engaged in collecting material from every part of Europe for his celebrated *Historisch-biographisches Lexikon der Tonkunstler* (1790–92), which work, though out of date, has never been excelled in Germany and still furnishes valuable material to those engaged in musical research A supplementary edition was subsequently published under the title *Neues Historisch-biographisches Lexikon der Tonkunstler* (4 vols, 1812–14) Gerber's extensive collection of books and musical manuscripts was purchased by the Gesellschaft der Musikfreunde of Vienna and furnished the nucleus of the large library afterwards formed by that society.

GERBER, JOHANN GOTTFRIED HEINRICH (1832–1912) A German engineer He was born at Hof, Bavaria, and was educated at Nuremberg and Munich. He built the bridge across the Isar at Grosshesselohe, and designed many large bridges in south Germany The so-

called "cantilever system," the germ of which may be seen in the labors of Pope, Canfield, and others, was patented by him under the name of "Trager mit freischwebenden Stutzen," and first practically applied by him at Regnitz The publications of Gerber include *Die Rheinbrucke bei Mainz* (1863), *Die Isarbrucke bei Grosshesselohe* (1859), *Das Paulische Tragersystem* (1859), *Trager mit freiliegenden Stutzpunkten* (1870)

GERBER, KARL FRIEDRICH WILHELM VON (1823–91) A German jurist and statesman, born at Ebeleben and educated at Leipzig and Heidelberg He was professor at Jena, Erlangen, Tubingen, and Leipzig, assisted in the codification of the German commercial and marine laws, and in 1871 became the successor of Falkenstein as Minister of Education in Saxony In 1891 he was appointed President of the Saxon ministry New laws on education were enacted during his administration, and the relation between the Catholic church and the state was more clearly defined His *System des deutschen Privatrechts* (1848–49; 17th ed, 1895) is the standard authority on that subject With Jhering he founded, in 1856, the *Jahrbucher fur die Dogmatik des Privatrechts*

GERBERT, zhâr'bâr'. See SYLVESTER

GERBERT, gĕr'bĕrt, MARTIN, BARON VON HORNAU (1720–93) A Roman Catholic prelate and writer on Church music He was born at Horb on the Neckar and received his education chiefly at the Jesuit School of Freiburg in Breisgau He joined the Order of the Benedictines in the monastery of Saint-Blaise in 1737, became priest in 1744, was soon thereafter appointed professor of theology, and was chosen abbot in 1764 From 1759 to 1762 he traveled in Germany, Italy, and France, chiefly with a view of obtaining access to the old collections of musical literature contained in the libraries of the monasteries In 1774 he published at Saint-Blaise *De Cantu et Musica Sacra,* in 1777, *Monumenta Veteris Liturgiæ Alemannicæ,* four parts, and in 1784, in three volumes, *Scriptores Ecclesiastici de Musica Sacra,* a collection of the principal writers on Church music from the third century till the invention of printing This work has been of very great importance for the history of music, by preserving writings which otherwise might either have perished or remained unknown He is also the author of *Codex Epistolaris Rudolphi I* (1772) and *Historia Nigræ Silvæ Ordinis Sancti Benedicti* (1783–88) He died at Saint-Blaise, May 3, 1793 Consult his life by Misard (Paris, 1867)

GERBI, jĕr'bĭ, **GERBA,** jĕr'ba See JERBA

GERBIL, jĕr'bĭl (from Fr *gerbille,* from Neo-Lat *Gerbillus,* dim of *gerbua,* variant of *jerboa,* from Ar *yarbū,* flesh of back and loin). Any of several ratlike rodents inhabiting Africa, Asia, and southern Russia About 50 species are known, forming a subfamily, Gerbillinæ, of the rat family (Muridæ), characterized by tufted tails and long and powerful hind limbs, giving them much the appearance of jerboas (q v) and enabling them to progress in long leaps with great rapidity. They live underground, in extensive connected burrows They are fawn-colored, very lively, emit an offensive odor, and are extraordinarily prolific Well-known species are the Egyptian gerbil (*Gerbillus ægyptiacus*) and the East Indian gerbil (*Gerbillus indicus*), which is strictly nocturnal and often colonizes in or near cultivated fields, where it does serious damage to grain crops

GERBO'A See JERBOA

GERCKE, gĕr'ke, ALFRED (1860–) A German classical scholar, born in Hanover and educated at the universities of Bonn and Berlin He taught in the Berlin Luisengymnasium in 1886–88, was privatdocent at Gottingen in 1890–93, professor at Greifswald in 1895–1909 and rector of the university in 1908, and after 1909 professor at Breslau He wrote on Seneca, *Seneca-Studien* (1895) and *Studia Annæana* (1900), *Griechische Litteraturgeschichte* (1898, 3d ed, 1911–13), *Geschichte der griechisch-romischen Philosophie* (2d ed, 1912), *Methodik* (1910), and, with Norden, *Einleitung in die Altertumswissenschaft* (1910–11, 2d ed, 1912 et seq), *Entstehung der Aeneis* (1913)

GERFALCON, jĕr'fa'k'n See GYRFALCON

GERGONNE, zhĕr'gŏn', JOSEPH DIEZ (1771–1859) A French mathematician, born at Nancy, France In 1792 he was enrolled in the Army of the Moselle and took part in the battle of Valmy He attended the artillery school at Chalons, was appointed lieutenant, and joined the French army campaigning in the Pyrenees When his regiment returned to Nîmes, he was appointed professor of mathematics at the *Ecole* of that city In 1816 he accepted the chair of astronomy at Montpellier and in 1830 the position of rector of the Montpellier Academy He was one of the founders of modern projective geometry and the first to enunciate the principle of geometric duality From 1810 to 1831 he published the journal *Annales de Mathématiques* or the *Annales de Gergonne*

GERGO'VIA The chief city of the Arverni, modern Gergovie, attacked unsuccessfully by Julius Cæsar in 52 B C.

GERHARD, ANDREAS. See HYPERIUS

GERHARD, gĕr'hart, EDUARD (1795–1867) A German classical archæologist He was born in Posen, and after studying at Breslau and Berlin took up his residence at Breslau in 1816 The reputation he acquired by his *Lectiones Apollonianæ,* published in the same year, led soon afterward to his appointment as professor at the Gymnasium of Posen On resigning that office in 1819, on account of weakness in the eyes, he traveled in Italy and in 1822 took up his residence in Rome, where, to prosecute his archæological studies, he remained until 1837 In that year he received an appointment as archæologist in the Berlin Museum In 1844 he became professor in the university and member of the Royal Academy During his long stay in Italy he cooperated in Platner's *Beschreibung der Stadt Rom* and in 1829 was one of the leading spirits in the foundation of the Instituto di Corrispondenza Archeologica, now the Imperial German Archæological Institute, of which he was vice secretary Gerhard's great service to archæological study was in the publication of important groups of monuments and in promoting an orderly classification Such a worker was much needed at this time, when the excavations at Vulci and elsewhere in Etruria increased so suddenly the mass of early vases and other small objects For artistic beauty and style Gerhard had little perception, his interest was largely antiquarian, and it is characteristic of him that he was attracted by the Etruscan art, generally of little interest to the artist His writings are widely scattered in the volumes of the Archæological Institute,

the Berlin Academy, and various periodicals Many of these are collected in the *Gesammelte academische Abhandlungen und kleine Schriften* (Berlin, 1866–68) Among his larger works are *Rapporto intorno i vasi Volcenti* (1831), *Antike Bildwerke* (1827–44), *Auserlesene griechische Vasenbilder* (1839–58), still the best single collection of Greek vases, a publication of selected vases from the Berlin collection, *Griechische und etruskische Trinkschalen* (1843), *Etruskische und campanische Vasenbilder* (1843), *Apulische Vasen* (1846), *Trinkschalen und Gefasse* (1848–50) *Etruskische Spiegel* (4 vols, 1843–68, 5th vol by Klugmann and Korte, 1884–97) With Panofka he prepared a catalogue of the Naples Museum in 1828 and in 1836 one of the antiques in the Berlin Museum. Though Gerhard's *Griechische Mythologie* (1854–55) is still valuable, his mythological work, as well as his interpretation of works of art, suffers from his overestimate of the importance of the mysteries and their symbolism Consult Jahn, *Eduard Gerhard, ein Lebensabriss* (Berlin, 1868), and Sandys, *A History of Classical Scholarship*, vol iii (Cambridge, 1908)

GERHARD, JOHANN (1582–1637). One of the ablest and most learned German exponents of Lutheran orthodoxy He was born at Quedlinburg, Oct 17, 1582 In his fifteenth year he came under the personal influence of Johann Arndt (q v), author of *Das wahre Christentum*, and resolved to study for the Church Soon after entering the University of Wittenberg (1599) he began to waver in this determination and ultimately interested himself for two years in the study of medicine, but in 1603 resumed his theological studies at Jena, and in the following year received a new impulse from Winkelmann and Mentzer at Marburg Having graduated and commenced lecturing at Jena in 1605, he in 1606 received and accepted the Duke of Coburg's invitation to the superintendency of Heldburg and mastership of the Gymnasium, soon afterward he became general superintendent of the duchy, in which capacity he was much and usefully engaged in the practical work of ecclesiastical organization until 1616, when he found a more congenial sphere in the senior theological chair at Jena, where the remainder of his life was spent and where he died, Aug 17, 1637 He was a prolific writer His most famous works are *Loci Communes Theologici* (1610–22) and his *Sacred Meditations* (1606), which have been translated into several languages (English, by Winterton, 1631, many editions). His life was written in Latin by Fischer (Leipzig, 1723) and in German by Boettcher (Dresden, 1858)

GERHARD, WILLIAM PAUL (1854–). An American sanitary engineer, born in Hamburg, Germany After graduating from the Polytechnic School, Carlsruhe, Baden, he spent one year as a civil engineer in his native city, was for several years in St Louis, Mo, assisted Col George E Waring (1881–83), edited *Building* (1885–86), and was sanitary engineer on the staff of the State architect of New York (1892–99) His publications include *House Drainage and Sanitary Plumbing* (1881, 10th ed, 1902), *The Disposal of Household Wastes* (1890), *Theatres* (safety, etc) (1900), *The Sanitation of Public Buildings* (1907), *Modern Baths and Bath Houses* (1908), *Guide to Sanitary Inspections* (4th ed, 1909), *Sanitation and Sanitary Engineering* (1909), *Flies and Mosquitoes as Carriers of Disease* (1911)

GERHARDT, gĕr'hart, DAGOBERT VON (pen name, Gerhard von Amyntor) (1831–1910) A German soldier, poet, and novelist, born at Liegnitz After attending the university he entered the Prussian army and advanced to the rank of major He was severely wounded in the assault upon the fortifications of Duppel during the Danish War of 1864 and in 1867 was employed by Moltke on the general staff at Berlin He served in the Franco-German War (1870–71) He has become known in literature rather late in life and then chiefly through his numerous novels, such as *Das bist Du!* (1882), *Ein Problem* (1884), *Vom Buchstaben zum Geiste* (1886), *Gerke Sutemanne* (3d ed, 1890), *Durch Nacht zum Licht* (1887), *Die Cis Moll Sonate* (1891), *Ein Kampf um Gott* (1902), and the sketch, *Eine moderne Abendgesellschaft*, treating of the Jewish question (3d ed, 1881)

GERHARDT, EDUARD (1813–88) A German architectural painter, born at Erfurt He was at first a lithographer, then studied architecture in Cologne, and under Semper in Dresden, but in 1837 took up painting at Munich He continued his studies (1848) in Italy, Spain, and Portugal Summoned afterward to Lisbon to instruct the princes of the royal family, he returned in 1851 and settled in Munich He excelled in depicting Moorish architecture, his oil paintings and water colors being of equal merit, as may be judged by "The Palace of the Inquisition at Cordova" (1863), "Lion Court in the Alhambra" (1861), "Interior of St Mark's, Venice" (1864), all in the New Pinakothek, and by "The Alhambra by Moonlight," "The Generalife," "The Comares Tower," and two views of Venice, all in the Schack Gallery, Munich

GERHARDT, ELENA (1883–) A distinguished German lieder singer, born in Leipzig, Nov 11, 1883 Although she had been a precocious child and sung at many school entertainments, her voice was not systematically trained until she entered the Leipzig Conservatory in 1899, where she studied under Marie Hedmont till 1903 In that year she leaped into fame at one bound, when she made her début in Leipzig in a recital with Arthur Nikisch at the piano Because of her extraordinary success she was practically forced, against her own inclination, into opera She appeared as Mignon and Charlotte (Werther) at the Leipzig Opera, eight times in each rôle, and then decided to abandon the stage to devote herself entirely to concert work Before long she was acknowledged as one of the world's greatest lieder singers, all Europe paid homage to her art In 1912 she made her first tour of the United States, appearing with signal success in numerous recitals and with the principal orchestras The demand for her services was such that in the following season she had to make a second American tour

GERHARDT, KARL FRIEDRICH (1816–56). An eminent French chemist, born at Strassburg At the age of 15 he was sent to the Polytechnic School at Carlsruhe, where his attendance at Walchner's lectures first awakened in his mind a taste for chemistry After two years he removed to Leipzig, where he attended the lectures of Erdmann, which seem to have developed in him a passion for questions of speculative chemistry. On his return home he reluctantly

entered upon the business of his father, who was a manufacturer of chemical products, but in his twentieth year he enlisted in a regiment of chasseurs He soon, however, found military life as insupportable as a commercial career He therefore purchased his discharge and set out for the laboratory of Giessen, where he worked under Liebig's direction for 18 months In 1838 he arrived in Paris and there was cordially welcomed by Dumas In the laboratory of the Jardin des Plantes he soon commenced, jointly with Cahours, his important researches on the essential oils In 1844 he was appointed professor of general chemistry in the faculty of sciences at Montpellier About this time he published his *Précis de chimie organique* In 1848 he resigned his chair and returned to Paris, in order to follow out uninterruptedly his special investigations, and in that city he established, between the years 1849 and 1855, in successive memoirs, his views of series and his theory of types It was there, also, that he gave to the scientific world his researches upon the anhydrous acids and the oxides In 1855 he was made professor of chemistry at Strassburg and corresponding member of the Academy of Sciences of Paris All his ideas and his discoveries are embodied in his *Traité de chimie organique* (4 vols, 1853–56) He had hardly completed the correction of the last proof of this great work when, after an illness of only two days, he died Consult Grimaux, *Charles Gerhardt sa vie, son œuvre, sa correspondance* (Paris, 1900), and Ostwald, *Grosse Manner*, vol i (Leipzig, 1909). See CHEMISTRY, AVOGADRO'S RULE

GERHARDT, PAULUS, or PAUL (1607–76). After Luther, the greatest of German hymn writers He was born in Saxony, studied at Wittenberg, and became pastor at Mittenwalde In 1657 he removed to Berlin, but retired in 1666, rather than enter the union with the Reformed church, and in 1669 removed to Lubben, where he died in 1676 He was an active supporter of the Lutherans in their controversies with the Reformed churches Among his most familiar hymns are "O sacred head once wounded" (Eng trans by J W Alexander), "Commit thou all thy griefs," and "Jesus, Thy boundless love to me" (English trans by John Wesley) Consult the critical editions of his hymns by Bachmann (Berlin, 1866) and Goedeke (Leipzig, 1877), his life by Langbecker (Berlin, 1841), Kelly, *Gerhardt's Spiritual Songs* (London, 1867). The first collection of his hymns appeared in 1667

GERHAR'DUS MAG'NUS See GROOTE

GERHART, EMANUEL VOGEL (1817–1904). An American minister of the German Reformed church He was born at Freeburg, Pa, and was educated at Marshall College and at the Mercersburg Theological Seminary After acting as president of Heidelberg College, in 1851 he became professor of theology in the Theological Seminary at Tiffin, Ohio, whence he was called to the presidency of Franklin and Marshall College in 1855, where he also lectured on mental and moral philosophy In 1868 he was appointed professor of philosophy at the Reformed Church Seminary, Lancaster, Pa He edited Rauch's *Inner Life* and, for several years, the *Mercersburg Review*, and wrote *Philosophy and Logic* (1858) and *Institutions of the Christian Religion* (1891)

GERHOH, gĕr'hō, or GERHOCH VON REICHERSBERG, gĕr'hŏk fŏn rīk'ĕrs-bĕrk (1093–1169) A German theologian, born at Polling, near Weilheim, Bavaria In 1132 he was appointed by Archbishop Conrad to the chief jurisdiction of the canonry of Reichersberg, and he became conspicuous as a reformer of the institution His *De Investigatione Antichristi* severely criticizes the ecclesiastical conditions of his time and is historically valuable in its bearing upon the Second Crusade His unfinished "Commentary on the Psalms" and most of his works are published in Migne's *Patrologia latina*, vols cxciii and cxciv (Paris, 1844–80), and the most important by Sackur in *Monumenta Germaniæ Historica* (Hanover, 1897) Consult the biography by Nobbe (Leipzig, 1881)

GERI (gā'rē) **AND FREKI,** frā'kē The wolves of Odin (q v) They lie at his feet as he is seated on his throne in Valhalla, ready to feast with his chosen heroes Odin himself needs no food, so he gives all the meat that is set before him to his wolves

GÉRICAULT, zhā'rē'kō', JEAN-LOUIS ANDRE THÉODORE (1791–1824) A French painter, the first leader of the Romantic school in its revolt against the tyranny of classicism of David

Géricault was born at Rouen, Sept 26, 1791 The family moved to Paris soon afterward, and the boy entered the Lycée Louis-le-Grand He left this school in 1808 He first entered the atelier of Carle Vernet (q v), and in 1810 he went over to the atelier of Guérin, but there was never any artistic sympathy between master and pupil Much of his time was spent in Versailles, where he found the stables of the palace open to him, and where he gained his knowledge of the anatomy and action of horses

At the Salon of 1812 Géricault exhibited one of the best known of his pictures, "A Cavalry Officer on Horseback" (now in the Louvre), which created an immediate sensation His "Wounded Cuirassier" was exhibited in the Salon of 1814, but was not especially successful Géricault in a fit of disappointment entered the army and served for a time in the garrison of Versailles In 1817 he went to Italy and, after a month in Florence, settled for two years in Rome The work of the Italian masters affected him powerfully, that of Michelangelo appealing especially to his temperament The productions of this period are perhaps the most vigorous of his entire career They are mainly in the form of drawings, of which many have been preserved The finest of these are a series of studies for a picture which he intended to paint of the horse race in the Corso during Carnival The painting called the "Raft of Medusa" (now in the Louvre) has come to be deemed one of the most powerful productions of the French school At the exhibition of 1819, however, it was placed too high and was received very coldly Géricault carried the picture to England, where he exhibited it at a shilling admission, realizing 20,000 francs During his stay in England Géricault associated much with Charlet, the lithographer and caricaturist, and while in England he painted his "Race for the Derby at Epsom" (Louvre), his last great painting. There are many of his powerful sketches and studies in the Louvre, the Rouen Museum, and other collections throughout Europe, and a number of his lithographs are preserved in the Cabinet des Estampes, Paris He also modeled bronzes and wax sketches, the finest of those surviving being

an anatomical study of a horse Géricault's temperament was too vivid and sympathetic to tolerate the formal and conventional The realities of his time appealed to him too intensely to permit his mind to rest upon the unrealities of the Classical school

Soon after his return to Paris in 1822 Géricault was injured by a fall from a horse and spent the rest of his life in extreme distress He died in Paris, Jan 18, 1824 Consult Blanc, *Histoire des peintres de l'ecole français* (Paris, 1865), Clément, *Géricault Etude biographique et critique* (ib, 1868), Brownell, *French Art, Classic and Contemporary* (New York, 1901), Muther, *History of Modern Painting* (London, 1907).

GERICKE, gā'rĭk-e, WILHELM (1845–1925) A German orchestral conductor He was born at Gratz, Austria, and early gave evidence of a strong musical temperament In 1862 he entered the Vienna Conservatory, where he studied under Dessoff Leaving the conservatory in 1865, he became kapellmeister of the theatre at Linz and in 1874 received the appointment of second kapellmeister of the Vienna Court Opera, of which Hans Richter (q v) was first kapellmeister On the retirement of Brahms from the conductorship of the Gesellschaftsconcerte in 1880, Gericke succeeded him and became also the conductor of the Singverein His fame as a conductor, and particularly as a drillmaster, induced the Boston (Mass) Symphony Orchestra to secure him as its leader From 1884 to 1889 he held the baton of the organization and succeeded in placing it in the front rank of the world's great orchestras In 1889 he returned to Vienna and to the leadership of the Gesellschaftsconcerte (Nikisch succeeding him in Boston), but resigned again in 1895 Three years later he once more took charge of the Boston Orchestra and retired in 1906 He has published many works for the orchestra, besides much pianoforte and chamber music

GE'RIG, JOHN LAWRENCE (1878–). An American university professor, born at Columbia, Mo, where he graduated from the University of Missouri in 1898 He studied also at the University of Nebraska (Ph D, 1902) and in Paris (1903–05), taught in the summer sessions of the universities of Missouri (1889) and Nebraska (1901), and was instructor at the latter institution in 1901–03 and at Williams College in 1905–06 At Columbia University he was lecturer, tutor, instructor, and assistant professor of Romance languages and Celtic between 1906 and 1911, when he became associate professor of the same subjects He was assistant editor of Edgren's *Italian Dictionary* (1902) and became associate editor of the *Romanic Review* and contributor to the *New International Yearbook* and to the NEW INTERNATIONAL ENCYCLOPÆDIA.

GERING, gā'rĭng, ULRICH (c 1440–1510) A Swiss printer He was one of the printers called by Guillaume Fichet, then rector of the Sorbonne, to put up the first printing press ever used in France In this he was assisted by Michel Friburger and Martin Crantz

GERIN-LAJOIE, gĕr'ân-lā'zhwa', ANTOINE (1824–82) A Canadian novelist and poet He was born in Yamachiche, Province of Quebec, and was educated at Nicolet Seminary While studying law, he became connected with *La Minerve* (Montreal), of which journal he was early chief editor (until 1847) In 1848 he was admitted to the bar He was one of the founders, and for several years president, of L'Institut Canadien In 1852 he became one of the French translators in the Canada Legislative Assembly and subsequently assistant parliamentary librarian He was a contributor, both in prose and verse, to several periodicals, principally to *Les Soirees Canadiennes*, of which he was one of the directors, and *Le Foyer Canadien*, of which he was one of the founders and also one of the editors He died at Ottawa His publications include *Le jeune Latour, tragédie en trois actes* (1844), *Catechisme politique* (1851), *Jean Rivard, le défricheur canadien* (1862–64), *Dix ans d'histoire du Canada, 1840–50* (1888), a luminous study of the period in which responsible government was established See CANADIAN LITERATURE

GERIZIM, gĕr'ĭ-zĭm. See EBAL AND GERIZIM

GERLACH, gĕr'lăg, ERNST LUDWIG VON (1795–1877) A Prussian statesman, born in Berlin He became one of the leaders of the Prussian High-Church party, and was president of the Magdeburg Superior Court from 1844 to 1874 In 1849 he was one of the founders of the *Neue Preussische Zeitung* (the *Kreuzzeitung*), in which he freely expressed his ultra-conservative views Elected to the Prussian Upper House in 1849, he was until 1858 a leader of the extreme Right He published a pamphlet, *Die Annexionen und der norddeutsche Bund* (1866), denouncing the annexations of 1866 and the exclusion of Austria from the German Bund He was killed by a carriage Consult the biographical material (Schwerin, 1903) edited by Jakob von Gerlach

GERLACH, FRANZ DOROTHEUS (1793–1876) A Swiss historian and classical scholar, born at Wolfsbehringen, near Gotha, and educated at Gottingen He was professor at the University of Basel from 1820 until shortly before his death and during the greater part of that time occupied also the position of chief librarian at that institution He was distinguished chiefly for his pedagogical ability His works include a German translation of Livy (1856–73), with an introductory volume entitled *Die Geschichtschreiber der Romer von den fruhesten Zeiten bis auf Orosius* (1855), and editions of Tacitus' *Germania* (1835), Sallust (1823–31), Lucilius (1846), and Nonius Marcellus (1842)

GERLACH, OTTO VON (1801–49) A German theologian He was born in Berlin, studied law at Heidelberg and Gottingen and theology at Berlin, preached for a time in the latter city, and became court chaplain in 1847 With his brothers, Ernst Ludwig von Gerlach (q v) and Leopold von Gerlach, he was an upholder of orthodoxy in Prussia He wrote a commentary on the Bible (1841, often reprinted, and published in a Swedish version) and was commissioned by Frederick William IV to study English Church organization

GERLACHE, zhâr'lash', ADRIEN DE (DE GOMMERY) (1866–) A Belgian naval officer, scientist, and explorer His field work began in 1895 as a member of the expedition to Jan Mayen and southeast Greenland He was the leading spirit in the organization of the Belgian Antarctic expedition, which he commanded in 1898–99, in the *Belgica* It was the first expedition to pass a winter within the Antarctic circle, and among its discoveries were Danco Land, Gerlache Strait, and other parts of Palmer Land, continent of Antarctica. Beset by

the pack, the *Belgica* drifted for 11 months across areas largely unvisited, its explorations covering the Antarctic Ocean between 70° to 72° lat S, 85° to 103° long W In 1901 he led a zoological expedition to the Persian Gulf In 1907 he accompanied the Duke of Orleans in his explorations of the sea off the coast of northeast Greenland Gerlache's principal publication is *Quinze mois dans l'Antarctique* (Paris, 1902) He was vice president of the Belgica Commission and later was appointed curator in the Royal Museum of Natural History, Brussels

GERLACHE, ETIENNE CONSTANTIN, BARON DE (1785–1871) A Belgian statesman and historian, born in Luxemburg He studied and practiced law in Paris In 1824 he was elected deputy from Liége to the Second Chamber of the States-General At the time of the revolution of 1830, as president of the committee appointed to revise the constitution, he advocated complete political and religious liberty and opposed the Duc de Nemours on the ground that the latter's election implied a sort of annexation to France He was head of the deputation sent to offer the crown to Prince Leopold of Saxe-Coburg In 1831, as President of the Chamber of Representatives, he received the oath exacted from the King by the constitution, and the following year was appointed first president of the Court of Cassation, which position he held until 1867 In 1843 he received the title of Baron He was one of the Catholic leaders, and after early radicalism became more and more conservative Gerlache was also widely known as a writer. His *Histoire du royaume des Pays-Bas depuis 1814 jusqu'en 1830* (1839) attacks the Dutch government and praises Catholic orthodoxy Besides some works on contemporaneous history, he published *Salluste et quelques-uns des principaux historiens de l'antiquité* (1859). His collected works were published in six volumes (Brussels, 1874–75) by Thonissen, with a biographical sketch Consult the biography by Juste (ib, 1870)

GERLAND, gĕr'lant, GEORG KARL CORNELIUS (1833–) A German geographer and ethnologist, born at Cassel and educated at Marburg and Berlin In 1875 he was appointed professor of geography and ethnology at Strassburg and in 1900 became director of the earthquake observatory in that city His works include *Ueber das Aussterben der Naturvolker* (1868), *Atlas der Ethnographie* (1876), "Die Zukunft der Indianer" (in the *Globus*, 1879), "Atlas der Volkerkunde," in Berghaus, *Physikalischer Atlas* (7th part, 1891–92), *I Kant, seine geographische und anthropologische Arbeiten* (1905), *Mythus von der Sintflut* (1912)

GERM See BACTERIA, DISEASE, GERM THEORY OF

GERMAIN, jĕr-mān', GEORGE SACKVILLE, VISCOUNT SACKVILLE (1716–85) An English soldier and politician He went to Westminster School and in 1731 accompanied his father, the Duke of Dorset, to Dublin on his appointment as Lord Lieutenant of Ireland Sackville, as he was called up to 1770, was educated at Trinity College, Dublin, and in 1737 was commissioned a captain in the Sixth Dragoon Guards Promoted lieutenant colonel of the Twenty-eighth Foot (1740), he served with his regiment under Cumberland in Flanders, being wounded at Fontenoy in May, 1745 He was made a colonel in 1746 During his father's second term as Lord Lieutenant of Ireland (1751–56) Sackville was his principal secretary and Secretary of War for Ireland, and sat in the English and Irish Commons In 1758 he took part in the expedition to Saint-Malo (France) and in the same year accompanied the third Duke of Marlborough as second in command of the English troops sent to Hanover to aid Prince Ferdinand of Brunswick in his operations against the French Sackville succeeded to the British command after the death of Marlborough, but for his refusal to obey Ferdinand's orders at the victorious battle of Minden (August, 1759) he was dismissed from the army and replaced by his rival Granby Charges of cowardice brought against him were not proved at a court-martial in 1760, but, his dismissal being approved on the ground of insubordination, he was declared unfit for military command, and his name was erased from the rolls of the Privy Council by George II Sackville's political career had begun in 1741 with his election to represent Dover in Parliament, and he continued as a member of the House from some constituency until 1761, when he was chosen for three constituencies and sat for Hythe In 1763, after George III became King, his name was restored to the list of privy councilors, and he began to take part in the debates in Commons as a supporter of Lord North The first actual mark of favor shown him was his appointment as Vice Treasurer of Ireland, a position he held during 1765–66 In 1769 he was declared by some, without much reason, to be the author of the *Junius Letters* (See J Jaques's *History of Junius*, 1843) He assumed the name of Germain in 1770, after the valuable estate of Drayton and £20,000 had been left him by Lady Elizabeth Germain (1680–1769), a friend of Dean Swift and the widow of Sir John Germain (1650–1718), an English soldier of fortune From 1775 to 1779 he was Lord Commissioner of Trade and Plantations, and Secretary of State for the Colonies until the resignation of Lord North in 1782 In charge of the actual conduct of the war in America, he did much to embitter the Americans against the mother country by his advocacy of harsh measures, by the employment of continental mercenaries and Indians, and by his continued opposition to all propositions looking towards peace In 1777 he planned the invasion of Canada and Burgoyne's campaign, which turned out so badly After the fall of the North ministry he was created Viscount Sackville (1782) and retired from public life

GERMAIN, SAINT See GERMANUS, SAINT

GER'MAN, J EDWARD (1862–) An English orchestral composer He was born at Whitchurch in Shropshire and after preliminary instruction under local teachers became a student at the Royal Academy of Music, where he studied from 1880 until his graduation in 1887 as an associate, the rank of fellow being granted him in 1895. In 1888–89 he was director of music at the Globe Theatre, London After that he devoted his entire time to composition He wrote an operetta, *The Rival Poets* (1886), two symphonies, considerable chamber music, and incidental music to several of Shakespeare's plays, as *Richard III, The Tempest, Romeo and Juliet, As You Like It, and Henry VIII,* by which he has become best known He has also brought out operas *Merry England* (1902), *The Princess of Kensington* (1903), and *Tom Jones* (1907).

GERMAN BAPTIST BRETHREN. Now known as CHURCH OF THE BRETHREN (q v)

GERMAN BAPTISTS. See BAPTISTS

GERMAN CATHOLICS The name given to a sect which originated in Germany in 1844 and had a short existence In that year Johannes Czerski (q v) undertook to found the Christian-Apostolic Catholic Congregation at Schneidemuhl in Posen. The confession of faith drawn up by Czerski rejected certain doctrines and practices of the Roman Catholic church, but retained the Nicene Creed, the seven sacraments, and prayer for the dead, it declared the Bible the only sure source of Christian faith In the same month and year Johannes Ronge (q v) uttered his protest against the exhibition of the holy coat (q v) at Treves, and the following year was called to take charge of a large German Catholic congregation at Breslau Ronge's confession of faith was far more radical than that of Czerski and had a decided rationalistic tendency. The movement spread with remarkable rapidity, and many similar congregations were formed. In March, 1845, a conference was held at Leipzig and an organization effected Among the prominent members of this gathering was Robert Blum (q v) The movement was forbidden in Austria and Bavaria By the end of 1846 there were 60,000 German Catholics, more than half of them in Silesia A second council was held at Berlin in 1847, at which liberal and rationalistic tendencies were still more marked The decline of the association was due to two causes—the active part which many of its members took in politics, and the continual controversy between the adherents to the rationalistic confession of Ronge and those who preferred the more evangelical one of Czerski After the revolution of 1848 it rapidly went to pieces In 1850 it was united with the Free Congregations (q v). In 1863 Ronge and Czerski attempted to revive the movement by the Religious Reform Union. It is now practically dead. Consult. Gunther, *Bibliothek der Bekenntnissschriften der deutschkatholischen Kirchen* (Jena, 1845); Bauer, *Geschichte der Grundung und Fortbildung der deutschkatholischen Kirche* (Meissen, 1855); Kampe, *Wesen des Deutschkatholicismus* (Tubingen, 1850), Findel, *Der Deutschkatholicismus in Sachsen* (Leipzig, 1895).

GERMAN COLONIES At the outbreak of the Great War in 1914, the German Colonies, or so-called protectorates, were Togoland (acquired in 1884), Kamerun (1884), German Southwest Africa (1884), German East Africa (1885), German New Guinea (1884), German Samoa (1900), and the territory of Kiaochow (1897) German New Guinea included Kaiser-Wilhelmsland, the Bismarck Archipelago, and the German Solomon Islands, while administratively attached to it were the Micronesian Islands acquired in 1899, viz, the Caroline, Pelew, Marshall, and Marianna islands (except Guam). Total area, 1,140,115 square miles, total population 13,258,000

The overseas dominions of Germany were attacked at the very beginning of the war and all of them were conquered before the war was over Togoland was captured in a campaign which lasted just three weeks It was surrounded on three sides by hostile territory and the British controlled the sea The initial campaign was begun on Aug. 7, 1914, and on August 28 the German governor surrendered the colony Kamerun presented a much more difficult problem Although surrounded by hostile country its vast size presented a huge obstacle In 1914 and 1915 the Germans successfully repelled the Allied invasions Early in 1916, French, Belgian, and British columns closed in and compelled the surrender of the government The campaign against German Southwest Africa really began when Luderitz Bay was occupied on Sept 18, 1914 Swakopmund was seized on Jan 14, 1915 From these two points an attack was directed against Windhoek, the capital This was entered May 12, and on July 9, General Botha received the surrender of the colony at Grootfontein

The most important German colony in Africa was German East Africa Its capture gave the Allies considerable trouble In 1914 the Germans repulsed every effort of the British to invade it In September, 1915, the Allies began a determined campaign The Belgians, French, British, and Portuguese advanced on all sides All the seaports fell into the hands of the British Fleet It was not until Nov 14, 1918, however, that General von Lettow-Vorbeck finally surrendered

The German possessions in the Pacific fell an easier prey to the Allies than those in Africa Shortly after Japan's entrance into the war she began a land and sea attack on Kiaochow (Aug 27, 1914), Germany's possession in China Land forces captured Tsingtao on November 7, and Kiaochow was in Allied hands An expedition from Australia and New Zealand captured German Samoa on Aug 30, 1914 On its return from Samoa the British squadron captured Herbertshohe, the capital of the Bismarck Archipelago, and, on September 27, took possession of the town of Friedrich Wilhelm in Kaiser-Wilhelmsland (German New Guinea) During September and October Australian and Japanese expeditions seized the remaining German possessions in the Ladrone, Marshall, and Caroline Islands

The Peace Conference, which closed the war decided not to return any of the colonies to Germany The final disposition of them (in the form of mandates) was as follows in German East Africa the region between Lake Victoria and Lake Tanganyika was given to Belgium, the rest to Great Britain, German Southwest Africa to the Union of South Africa, Togoland, two-thirds nearest Dahomey to France, the rest to Great Britain, Kamerun, mostly to France, a small strip near Nigeria to Great Britain, in Oceanica all islands north of the Equator were given to Japan, all islands south of the equator to Australasia Japan received Kiaochow and Shantung in Asia For further details see SUPPLEMENT

GERMAN'DER from Fr *germandrée*, Sp *camedris, cemedreo*, from Lat *chamædrys*, wall germander, from Gk χαμαίδρυς, *chamaidrys*, germander, from χαμαί, *chamai*, on the ground + δρῦς, *drys*, oak), *Teucrium* A genus of numerous and widely distributed species of plants of the family Labiatæ The common germander, or wall germander (*Teucrium chamædrys*), often found on ruined walls in Great Britain, has probably been introduced from the south of Europe It is a small, almost shrubby perennial, with wedge-shaped, ovate, serrate leaves, and whorls of large reddish-purple flowers It is bitter, somewhat aromatic, and was formerly much used in medicine, particularly as a principal ingredient in a once famous gout medicine called Portland powder Similar medicinal virtues were ascribed to *Teucrium botrys*, a small annual species common on dry hills in

Germany, having aromatic fragrance and yellow flowers Cat thyme (*Teucrium marum*), a native of the south of Europe, abounds in a pungent volatile oil, has a camphor-like smell, and, like catmint and valerian root, is greatly relished by cats It is often used as a sternutatory Two species are rather abundant in the United States—wood sage, or American germander (*Teucrium canadense*), in low ground in the eastern part of the United States, and *Teucrium occidentale* in the West

GERMAN EAST AFRICA The largest and most important former colonial possession of Germany It lies on the east coast of Africa, from lat 1° S to about 11° to 40′ S, and from about long 29° E to 40° 40′ E, with a coast line of 620 miles It is bounded on the north by British East Africa, on the east by the Indian Ocean, on the south by Portuguese East Africa and British Central Africa, on the southwest by Rhodesia, and on the west by Belgian Congo The area is estimated at 384,170 square miles—almost double the size of Germany The small island of Mafia, off the coast, also belongs to the colony

Topography and Hydrography Bordering the ocean, the region is a narrow coastal plain formed by sedimentary strata and coral limestone Behind the jungle-covered plain rises a wide plateau, extending to Tanganyika, from 3000 to 4000 feet in height and comprising over 90 per cent of the country It is surmounted in the east by the hills and mountains of Usambara, Useguha, Usagara, and other districts, which extend south to the Rufiji River and inland about 300 miles This mountain region, some of whose peaks are 6000 feet high, is in the northern part well watered, well wooded, and fruitful, and its drainage reaches the Indian Ocean through the Pangani, Rufu, Wami, and Rufiji rivers, while in the south the country is almost a desert West of the mountains is a wide steppe region, dry and poverty-stricken, shut off by the mountains from the moist southeast trades of the Indian Ocean The thirsty steppe merges gradually into the high fertile plain of Uniamwesi, south of Victoria Nyanza On the west border of the colony the plateau is broken by the cleft of the Great Rift valley (q v) and also by vertical displacements which have raised the strata west and north of Lake Nyassa into mountains of considerable elevation, some peaks of the Livingstone Mountains reaching 6000 to 9000 feet The lofty volcanic mass of the Mfumbiro Mountains lies on the northwest boundary In the north the plateau is intersected by a number of subordinate rifts and has been the seat of volcanic activity Mount Kilimanjaro, an isolated volcanic peak, rising to a height of 19,720 feet, is the culminating point of Africa

Climate The climate is tropical and unhealthful, especially along the coastal plain, where malaria prevails On the coast there are two rainy seasons—from the middle of March to the end of May and from the middle of October to the middle of December; in the interior there is only one rainy season, from November to the end of April The mean annual temperature is about 78° F in the coast land, and considerably above that in some parts of the interior

Agriculture, Commerce, etc Agriculture and cattle raising are the chief occupations of the settled natives Millet is grown in most parts, while wheat, sesame, tobacco, and rice are confined to certain localities Bananas are cultivated chiefly on the coast The German government furthered agricultural development by establishing experiment stations and plantations among the highlands of the northeastern part of the colony, to which the German plantations were almost wholly confined Nearly all European vegetables thrive in some of these high districts Hundreds of thousands of coffee shrubs have been reared on the German plantations, the crop thrives, and exports are increasing The tobacco crop is rapidly increasing, but it is of poor quality and is sold only to the natives and Arabs Cotton is exported, but sugar and copra are more important The collecting of India rubber makes steady progress In 1912 there were 43,617 cattle and 41,647 sheep and goats owned by Europeans, and 3,950,250 cattle and 6,398,300 sheep and goats owned by natives The chief exports are rubber, copra, ivory, vegetable fibre, and coffee, while the imports consist mostly of provisions, textiles, hardware and iron, and rice The imports increased from 23,806,000 marks, and the exports from 12,500,000 marks in 1907, to 38,659,000 and 20,805,000 in 1910, and 50,309,000 and 31,418,000 in 1912 The trade, about half of which was with Germany, passes chiefly through the ports of Dar-es-Salaam, Bagamoyo, Pangani, Kilwa, Lindi, Mikindani, and Tanga The colony had regular steam communication with Germany and Bombay The three boundary lakes are navigable by steamers The main roads are good throughout the colony The Usumbara Railway, from Tanga to Muhera (219 miles), is open to traffic The Tanganyika Railway, from Dar-es-Salaam, reached Kigoma (about 740 miles), on Lake Tanganyika, in February, 1914 The chief ports are connected by telegraph with Zanzibar and inland points and through the latter with the African transcontinental line

The native population in 1913 was estimated at 7,659,898, other non-Europeans, as Arabs, Indians, etc, living mainly on the coast, were estimated at 15,000 The white population, Jan 1, 1913, was 5336, of whom 4107 were Germans The natives are of the Bantu race The seat of government is Dar-es-Salaam (q v)

History. German colonization on the east coast of Africa began in 1884, when an expedition sent by the German Colonization Society (established in the same year) secured by treaty the territories of Useguha, Nguru, Usagara, and Ukami This movement was made in secret on account of the enormous influence which Great Britain exercised over this territory In 1885 the German East Africa Company came into existence, and during 1885–86 succeeded in extending its dominion along the coast from Somaliland to the mouth of the Rovuma, with the exception of the territory around Mombasa, then in the possession of the British By the Anglo-German agreement of 1886 the northern boundary of the colony was fixed, and the dominions of the Sultan of Zanzibar on the mainland reduced to a narrow strip along the coast. The southern boundary of the colony was fixed in 1887 By a second agreement with Great Britain, in 1890, the Territory of Vitu, then within the German sphere of influence, was exchanged for Helgoland (q v), in the North Sea. The Sultan of Zanzibar renounced his claim to all his mainland possessions for the sum of 4,000,000 marks ($952,000), and from Jan. 1, 1891, the colony remained under the control of the German government till it was lost in the war Con-

sult Reichard, *Deutsch Ostafrika* (Leipzig, 1898), Stuhlmann, *Handwerk and Industrie in Ostafrika* (Hamburg, 1910), Fonck, *Deutsch Ostafrika* (5 vols, Berlin, 1907–10), Brode, *British and German East Africa* (New York, 1911) See GERMAN COLONIES, SUPPLEMENT

GERMAN EAST AFRICA COMPANY. See EAST AFRICA COMPANY, GERMAN

GERMAN EMPIRE. See GERMANY

GERMAN EVANGELICAL PROTESTANT CHURCH The name given collectively to a number of independent German churches in the United States, mostly west of the Alleghany Mountains No general organization of these churches has been instituted, but a union of ministers has been formed, which is called the German Evangelical Protestant Ministers' Association of North America This body is of comparatively recent origin, although some of the churches whose ministers are affiliated with it are old It is founded on the basis of the principles of the United church of Prussia of 1817 Its purposes, as set forth in its published organs, are to furnish a worthy representation of the German Evangelical Protestant church in North America, to promote the association of the ministers, for mutual assistance, advancement in knowledge, and greater practical efficiency for their work and for the benefit of their congregations, and to secure the preservation of the independence, while promoting the connection, of the German Evangelical Protestant congregations and ministers The doctrinal principle of the union is the gospel of the Lord Jesus Christ, the interpretation of which is left to the judgment of the believer, enlightened by the Christian idea The association is composed of three district associations—those of Cincinnati, of Pittsburgh, and the Western District Association—and is under the management of a central board, or *Behorde,* consisting of a president, a treasurer, a secretary, and three trustees The congregations have no part in it It maintains an orphans' home and a home for the aged near Pittsburgh, aids in the support of the Protestant orphans' homes in Cincinnati and St Louis, and assists other benevolent institutions when required. The periodical organ of the association, the *Kirchenzeitung,* is published monthly at Pittsburgh and Cincinnati. A periodical for youth, the *Christlicher Jugendfreund,* is published semimonthly The book list of the publishing house at Cincinnati comprises a hymn book and a small number of books of elementary religious instruction, devotional books, and the *Protestantischer Volkskalender* In 1914 the number of ministers in the association was about 60, some of them having charge of two or more congregations; and the number of members in the congregations was about 35,000

GERMAN EVANGELICAL SYNOD OF NORTH AMERICA, THE A Church organized Oct. 15, 1840, when six German ministers doing missionary work in Missouri and Illinois met at Gravois Settlement, Mo, and formed the German Evangelical Association of the West Most of its early ministers had been ordained in the Evangelical church of Prussia, some had been sent out by the Basel and other missionary societies, and a large number of the members of their congregations had been attached to the United Evangelical church in their native land Other Evangelical unions were organized in other parts of the country and in time were united with this one—the German Evangelical Church Association of Ohio in 1858, the German United Evangelical Synod of the East in 1860, and the Evangelical Synod of the Northwest and the United Evangelical Synod of the East in 1872 As these unions were effected, the name of the church was changed to Evangelical Synod of the West in 1866, and the German Evangelical Synod of North America in 1877 The doctrinal position of the church, as defined in the declaration in its constitution (sec 2), is that it "considers itself a part of the Holy Christian Church, and as such does acknowledge the Holy Scriptures of the Old and New Testaments as the only true and infallible guide of faith and life, and accepts the interpretation of the Holy Scriptures given in the symbolical books of the Lutheran and Reformed churches in so far as they agree In all points of difference the Evangelical Church refers to and abides by the words of the Holy Scriptures, availing itself of that liberty of conscience which, as a component part of the basis of man's ultimate responsibility to God Himself, is the inalienable privilege of every believer" The chief governing body is the General Synod, which meets every four years and is composed of pastoral, lay, and teacher delegates, chosen by the district meetings The church is divided into 20 districts, which have charge of local affairs, with officers responsible to the General Synod or its president The districts are the Atlantic, Indiana, Iowa, Kansas, Michigan, Minnesota, Missouri, Nebraska, New York, North Illinois, Ohio, the Pacific, Pennsylvania, South Illinois, Texas, West Missouri, Wisconsin, Colorado, Washington, and the Mission The work of home missions is carried on under supervision of the various district boards and the General Board for Home Missions and is aided by the Church Extension Fund. The denomination maintains foreign missions in India, where the communicants and adherents number about 3500 The church property was valued in 1914 at nearly $14,000,000, and over $1,000,000 is spent annually for the maintenance of churches The official organs are *Der Friedensbote* and *The Messenger of Peace,* both published at St Louis Formerly nearly all the publications were issued in the German language, but in recent years the publications have been printed in the English language also The denomination sustains Elmhurst College at Elmhurst, Ill, and the Eden Theological Seminary at St Louis Charitable institutions are maintained for orphans, superannuated ministers, and the widows and orphans of deceased ministers Nine institutions are engaged in deaconess work on the Kaiserswerth model. In 1913 the communicants of the denomination numbered 25,894, the churches 11,026, and the ministers 1038 In addition to the publications mentioned above there are printed at St Louis the *Theologisches Magazin,* the *Evangelical Herald,* and a number of children's and Sunday-school periodicals

Consult. Schory, *Geschichte der deutschen evangelischen Synode von Nord-Amerika* (St Louis, 1889), Behrendt, *Die Heidenmission der deutschen evangelischen Synode von Nord-Amerika* (St Louis, 1901), Carroll, *Religious Denominations in the United States* (New York, 1912)

GERMA'NIA. An opera by Franchetti (q v), first produced at Milan, March 11, 1902, in the United States, Jan 22, 1910 (New York).

GERMA'NIA The general name under which the Romans designated a great part of modern Germany and, in addition, two districts respectively in the east and in the extreme north of Gaul, called Germania Superior (or Prima) and Germania Inferior (Secunda) Germany proper was styled Germania Magna, Germania Transrhenana (beyond the Rhine), or Germania Barbara The boundaries of the region comprehended under these designations were the Rhine and Celtic Gaul on the west, on the east, the Vistula and the Carpathian Mountains, on the south, the Danube, and on the north, the sea, which was divided by the Cimbric Chersonesus (Jutland) into the German and the Suevic (Baltic) seas Archæological evidence, such as the discovery of Baltic amber in Mycenæ, points to very early communication between Germany and the Mediterranean lands (See also PYTHEAS) The first occurrence in connection with the history of the people of Germania with which we are acquainted was the appearance of warlike tribes of Cimbri and Teutones in the present Styria, where they defeated the Roman consul Papirius in the year 113 B C Eleven years later these tribes again came into collision with the Roman arms, but the result was their signal defeat by Marius The names "Germani" and "Germania" do not seem to have been appellations in use among the people themselves (consult Cæsar, *De Bello Gallico*, ii, 4, Tacitus, *Germania*, 2), and it is probable that the Romans borrowed them from the Gauls, who, it would seem, applied the name "Germani" at first to the group of nations that first invaded Gaul by crossing the Rhine and later to all the peoples beyond the Rhine The name "Germani" has been connected with a Celtic root meaning "to shout", the Germani would thus be "Shouters" They accompanied their attacks on their enemies by loud cries When Julius Cæsar opened his Gallic campaigns (58 B C), he found the Germanic nations of the Triboci, Nemetes, and Vangiones in possession of the districts lying between the left bank of the Rhine and the Vosges, while he even encountered a rival pretender to the supremacy of Gaul in the person of Ariovistus, the leader of the Suevic tribe of the Marcomanni (q v, see also SUEVI) The Germanic peoples west of the Rhine were reduced to subjection by Cæsar with the rest of Gaul, while the Tencteri and the Usipetes, who had invaded Belgium, were driven, together with the Sicambri, across the Rhine to their former settlements by the victorious general, who for the first time (55 B C) led a Roman army into Transrhenic Germany The quiet which Cæsar's victories had secured in the Rhenish districts was again so seriously disturbed by the Usipetes and several of the neighboring tribes in the year 16 B C that Augustus, who had hastened to Gaul on the outbreak of disturbances, saw that stringent measures must be adopted to keep the Germans in check and sent Drusus at the head of eight legions into Germany (See DRUSUS, 3) The first step of the Roman general was to dig a canal ("*fossa Drusiana*") from the Rhine to the Yssel, by which the Roman galleys could sail from the heart of the continent to the ocean, and so successful were his measures that in the course of four campaigns he had carried the Roman arms as far as the Albis (Elbe), subdued the Frisii, Batavi, and Chauci in the north, and defeated the Catti of the Mœnus (Main) districts Drusus, who died 9 B C, began the series of forts, bridges, and roads which were completed and extended under succeeding commanders The attempt made by Varus, under the direction of Augustus, to introduce the Roman provincial forms of administration into Germany brought, however, a sudden check to the advance and consolidation of Roman power, for the tribes of central Germany, indignant at this attempted subversion of their national institutions, ranged themselves under the leadership of Arminius (q v), a chief of the Cherusci, who organized a general revolt The result of this movement was the destruction, in the Saltus Teutoburgiensis in 9 A D, of the three legions commanded by Varus and the subsequent loss of all the Roman possessions between the Weser and the Rhine The news of this disastrous event threw the city of Rome into consternation Germanicus, who was sent forth in 14 A D to restore Roman supremacy, would probably have again wholly subjugated the Germanic tribes had he not been recalled by Tiberius in the midst of his victories From this time forth the Romans ceased their attempts to conquer Germany and contented themselves with repelling the incursions which the tribes made on their frontiers and endeavoring by their influence to foster the intestine disturbances which were perpetually generated through the ambition and jealousy of rival leaders, such as Arminius, Marbadius, and the Goth Catualda After the murder of Arminius by his own people, the power of the Cherusci declined, while the Longobards (see LOMBARDS) and Catti began to assert a recognized preponderance among the neighboring tribes Occasional encounters took place between the people of central Germany and the legions who guarded the well-protected Roman boundary line, which extended from the Rhine to the Taunus and thence to the Danube (see LIMES ROMANUS, SAALBURG), and from time to time the Batavi and other warlike tribes of the north and northwest, who, like them, had been brought into partial dependence on the Romans, rose in formidable insurrection, but after Trajan had restored order and strengthened the forts, peace remained undisturbed in the north till the beginning of the third century, while, with the exception of the sanguinary war of the Marcomanni and Quadi under Marcus Aurelius which began about the year 166 A D, there was a similar absence of hostilities in the south During this period important towns sprang up in Germany See AUGSBURG, BONN, COLOGNE, SPEYER, STRASSBURG, TRIER

With the third century the tide of war turned, and the Romans were now compelled to defend their own empire from the inroads of the numerous Germanic tribes, foremost among whom stood the powerful confederacies of the Alemanni and the Franks In their track followed, during the next two centuries, successive hordes of the Vandals, Suevi, Heruli, Goths, and Longobards, who soon formed for themselves states and principalities on the ruins of the old Roman provinces From this period almost down to the establishment of the Western Empire in the person of Charlemagne, the history of Germany is a blank, but the condition of the country when he entered on the possession of his German patrimony showed that since the retirement of the Romans the

lesser tribes had become gradually absorbed in the larger, for on his accession the land was held by a few great nations only, as the Saxons, Frisians, Franks, Swabians, and Bavarians, whose leaders exercised sovereign power within their own territories, and, in return for military services, parceled out their lands to their followers

The knowledge which we possess of the habits and government of the ancient Germans is principally derived from Cæsar's *Commentaries on the Gallic War* and the *Germania* of Tacitus According to the Roman historians, the Germans were a people of high stature, fair complexion, and red or yellow hair, endowed with great bodily strength, and distinguished for an indomitable love of liberty The men delighted in active exercises and the perils of war, and the women, whose chastity was without reproach, were held in high esteem Each master of a family had absolute power over those of his household Their habitations were generally separate and surrounded by their several stalls and garners, for, although there were villages whose inhabitants made common use of the fields and woods surrounding them, the Germans seem to have preferred isolated and detached dwellings to aggregate settlements Towns and cities they long regarded with aversion, as inimical to personal freedom In regard to their political organization it would appear that several villages formed a "hundred," several hundreds one "gau," and several gaus one "tribe" In each tribe the people were divided into four classes—nobles, freemen, freedmen or vassals, and slaves The king or chief was elected from among the nobles, but his power was very limited, and the government of the several tribes seems to have been democratic rather than monarchical

The religion of the Germans, which is shrouded in great obscurity, was based upon myths of the creation of the world, and the existence of gods having the forms and the attributes of a perfect humanity The different tribes had all their special gods or demigods, who were often their own leaders or chiefs, to whom the attributes of the god to whose worship they were most partial were ascribed. It is generally said that the Germans had neither temples nor statues Both Cæsar and Tacitus expressly affirm this Tacitus himself (*Annales*, i, 51) mentions a *templum* of a goddess Tamfana, or Tanfana, among the Marsians, but *templum* may here mean only a consecrated grove At a later period we find Christian missionaries exhorting the Germans to change their pagan temples into Christian churches, while we also read of the destruction of pagan idols Nevertheless, the religion of the Germans was mainly carried on in the open air in groves and forests and on heaths and mountains Although a priestly order also existed among the Germans, each master of a household performed religious services for himself and his family within his own homestead A knowledge of the will of the gods and the events of the future was sought by divination, from observations of the flight of birds, the rushing of waters, and other similar signs, in the interpretation of which women were thought to be especially skilled Belief in a future life, and in an abode after death for those who had deserved well in this life, was cherished among the Germanic races, who had a strong faith in retributive justice, whose sway they believed would be extended over the gods by involving them in a universal annihilating conflict as the punishment of their evil deeds, after which a new world was to arise, guarded by a pure and perfect race of gods In addition to the higher deities the Germans peopled every portion of space with a class of subordinate beings who pervaded the earth, air, and water, in the shape of elves, nixies, kobolds, dwarfs, and giants The Roman accounts of ancient Germany are summarized and discussed by Stubbs in his *Constitutional History of England*, vol i (6th ed, 3 vols, Oxford, 1897) Consult also Kingsley, *The Roman and the Teuton* (London, 1887), Henderson, *History of Germany*, vol i (2 vols, New York, 1902), Zeuss, *Die Deutschen und die Nachbarstamme* (Munich, 1837, new ed, Gottingen, 1904), Dahn, *Urgeschichte der germanischen und romanischen Volker* (Berlin, 1880–89) and *Die Konige der Germanen* (Munich, 1862), and the article "Germania" in Lubker, *Reallexikon des klassischen Altertums* (8th ed, Leipzig, 1914)

GERMAN'ICUS CÆ'SAR (15 B C–19 A D). A distinguished Roman general He was the son of Nero Claudius Drusus Germanicus (see DRUSUS, 3) and Antonia, daughter of Marcus Antonius and niece of Augustus He was adopted in the year 4 A D by Tiberius, whom he accompanied in the war waged against the Pannonians and the Dalmatians for the purpose of securing the German frontiers after the defeat of Varus (q v, see also ARMINIUS, GERMANIA) After having been consul in 12 A D, he was appointed in the following year to the command of the eight legions on the Rhine. On the death of Augustus, in 14 A D, the soldiers revolted, demanding higher pay and a shorter period of service Germanicus hastened from Lugdunum (Lyons), to remind them of their duty. The soldiers urged him to seize the supreme power, but he refused He, however, granted their demands, though his colleague, A Cæcina, secretly massacred the ringleaders at night Germanicus now led the legions over the Rhine below Wesel, attacked the Marsi during a nocturnal festival, and destroyed their celebrated precinct of Tanfana (see GERMANIA) In 15 A D he made a second inroad into Germany Proceeding from Metz into the country of the Catti (q v), he destroyed their chief town of Mattium (Maden, near Gudensberg) On his return his assistance was implored by the ambassadors of Segestes (always a firm ally of the Romans), who was besieged by his son-in-law, Arminius (q v.), the conqueror of Varus This was at once given, and Thusnelda, the heroic wife of Arminius, fell into the hands of the Roman general Arminius, burning with anger and shame, now roused the Cherusci (q v) and all the neighboring tribes to war Germanicus, in consequence, commenced a third campaign. He separated his army into three divisions The main body of the infantry was led by Cæcina through the country of the Bructeri, the cavalry under another general marched through Friesland, while Germanicus himself sailed with a fleet through the Zuyder Zee into the German Ocean and proceeded up the river Ems, where he joined the others. The united divisions now laid waste the country in the neighborhood of the Teutoburg Forest, and, gathering up the bones of Varus and his legions, which had lain there for six years, buried them

with solemn funeral honors A victory gained by Arminius induced Germanicus to make a hasty retreat, during which he lost part of his fleet in a tempest Cæcina, who retreated by land, sustained severe losses at the hands of the pursuing Germans Before the fleet of 1000 vessels, which Germanicus had built at Batavia, was equipped, he was recalled over the Rhine in 16 A D by news of the beleaguerment of the recently acquired fortress of Aliso on the Lippe The Germans were repulsed, and the funeral mound in the Teutoburg Forest, which they had thrown down, was again erected Germanicus now sailed with his fleet again into the Ems, pressed forward to the Weser, which he crossed, and completely overthrew Arminius in two battles. Nevertheless, he resolved to return, and on his way again lost the greater part of his fleet in a violent storm In order to prevent this mishap from giving courage to the Germans, he once more, in the same year, marched into the country of the Marsi and dispatched his lieutenant Silius against the Catti Tiberius now recalled him and bestowed upon him the honor of a triumph, in which Thusnelda appeared among the captives As Tacitus explains it, to rid himself of Germanicus, whose popularity seemed to render him dangerous, Tiberius sent him, in 17 A D, with extensive authority, to settle affairs in the East, at the same time appointing as Viceroy of Syria Gnæus Calpurnius Piso, who everywhere counteracted the influence of Germanicus However, he arranged matters without much difficulty in Asia Germanicus died at Epidaphne, near Antioch, Oct 10, 19 A D His friends charged that he had been poisoned, at Tiberius' orders, by the wife of Piso, modern scholars incline rather to the belief that he died a natural death He was deeply lamented by both the inhabitants of the provinces and the citizens of Rome, whither his ashes were conveyed, and deposited by his wife, Agrippina (q v), in the mausoleum of Augustus Agrippina herself and two of her sons were put to death by order of Tiberius, her third son, Gaius (afterward the Emperor Caligula), was spared Of the three daughters who survived their father, Agrippina became as remarkable for vices as her mother had been for her virtues Besides his splendid generalship, Germanicus was conspicuous for his magnanimity, benevolence, finely cultured understanding, and personal purity of life He wrote several works of a rhetorical character, which have been lost, but of his poetical works we possesses an epigram, a version of the *Phænomena* of Aratus (q v), and fragments of a work of the same character, entitled *Diosemeia*, or *Prognostica*, compiled from Greek sources Germanicus' literary remains were first published at Bologna, in 1474. The latest edition is that of Breysig (Berlin, 1867). Consult, for extensive bibliography, the article "Iulius, 26," in Lubker, *Reallexikon des klassischen Altertums* (8th ed, Leipzig, 1914), and Schanz, *Geschichte der romischer Litteratur*, vol ii (3d ed, Munich, 1913)

GERMA/NIUM. A chemical element discovered by Winkler in 1886 Its discovery had been predicted by Mendeléeff in 1871, on the basis of the periodic law (q v.), and the fulfillment of the prediction was characterized by Winkler as "an eminent extension of the chemical horizon, a mighty step forward in the domain of knowledge" Mendeléeff had named his to be discovered element *ekasilicon*, on account of its close relationship to the elements of the silicon group He predicted that, when discovered, the new element would be found to have an atomic weight of about 72, as a matter of fact, germanium (symbol, Ge) has an atomic weight of 72 5 Mendeléeff predicted that ekasilicon would form two oxides—a monoxide and a dioxide, as a matter of fact, germanium forms the oxides GeO and GeO_2 According to Mendeléeff, ekasilicon would form a tetrachloride, which would be a volatile liquid, boiling at about 90° C and having a specific gravity of about 1 9, germanium forms a tetrachloride, $GeCl_4$, which boils at 86° C and has a specific gravity of 1 887 The dioxide of ekasilicon would, according to Mendeléeff, have a density of about 4 7 and would form a feeble acid, germanium dioxide has a density of 4 703 and forms a feeble acid The metal ekasilicon itself would, Mendeléeff predicted, be readily obtained by reducing its oxides and would have a specific gravity of about 5 5, metallic germanium is easily obtained from the oxide by reduction with nascent hydrogen and has a specific gravity of 5 469 Thus Mendeléeff's forecast of the physical and chemical properties of germanium was fully corroborated by experimental discovery

GERMAN IVY, *Hermaria glabra* A clinging plant often seen in house or garden culture, indigenous to southern Africa, but also occurring in Europe and cultivated in the United States in rockeries to some extent It bears clusters of small greenish-yellow flowers, and the stems grow 8 or 10 feet long It is well adapted to window culture See IVY

GERMAN LANGUAGE A sister language of English and Frisian, these three together constituting what is generally called the West-Germanic, or West-Teutonic, division of the Germanic group of the Indo Germanic languages German, as a general term, includes both the High and Low German dialects But, High German being the literary language and the language of the educated classes, the term "German" is frequently used as equivalent to "High German"

Area of the German Language The area of the German language is not identical either with that of the German stock or that of the German Empire Thus, in the larger part of eastern Germany (the country east of the rivers Elbe and Saale), the German-speaking population is, as far as the race is concerned, largely of Slavic or, in some cases, Baltic origin In this region the boundary between Slavs and Germans has been subjected in course of time to various changes At the earliest historic period (at the time when Tacitus wrote his *Germania*) eastern Germany was held by Germanic tribes Later on, probably in the sixth century A D., began the inroad of the Slavs, who by the middle of the eighth century had succeeded in crowding the Germans back even beyond the left banks of the Elbe and Saale From the time of Charlemagne to the present date the Slavonization of the East has been followed by its Germanization, or rather re-Germanization Except among the Wends or Lusatio-Sorbs around Cotbus in Brandenburg, and the Lithuanians in the northeastern corner of East Prussia, German is now spoken throughout those parts of Prussia which constituted the kingdom at the time of the accession of Frederick the Great (1740). It is only by many of the geographical names (including such familiar names as

Pomerania, Silesia, Berlin, Danzig, Dresden, Leipzig, etc) that the former extent of the Slavic settlements in Germany may still be traced. Towards the end of the eighteenth century, however, when in 1772, 1793, and 1795—under Frederick the Great, and his successor, Frederick William II—the Kingdom of Poland was divided between Russia, Austria, and Prussia, a new lot of Slavic inhabitants, and this time mostly of Polish extraction, fell to Prussia (which already possessed a large Polish population in Silesia) as its share in the partition, with the result that at present Polish is the mother tongue of about one-tenth of the whole population of Prussia

If we turn to other parts of Germany, we meet with Danes in the northern portion of the Prussian District of Schleswig, which until 1864 belonged to Denmark, and with Frenchmen in the western portion of the Reichsland of Alsace-Lorraine, which was retaken from France after the War of 1870–71

Of the 64 925,993 inhabitants of the German Empire returned in the census of 1910, upward of 4,200,000 were entered as speaking foreign languages Of this number, nearly 3,330,000 were Poles (including Kassubs and Mazurs), 107,000 Czechs and Moravians, 93,000 Wends, 106,000 Lithuanians, nearly 224,000 French, 141,000 Danes, 80,000 Dutch, 66,000 Italians, and 20,000 Frisians

German is the vernacular of almost the whole of Luxemburg, of the greater part of Switzerland, and of portions of Austria-Hungary In Luxemburg the German-speaking population in 1910 amounted to 221,000 (out of a total population of 259,891), in Switzerland to 2,599,154 (or 69 per cent of 3,741,971), in Cisleithan Austria the census of 1910 states the German-speaking population at 9,950,266 out of a total population of 28,571,834, in Hungary at 2,037,-435 out of a total population of 20,886,787

Russia, too, has a German element of some importance There are many German settlements in the southern Russian provinces, one of them, founded in 1768 (between Kamyshin and Volsk on the Volga), consisting of 173 villages and covering an area not much smaller than that of the Kingdom of Saxony. German has, moreover, from the thirteenth century on been the language of the educated classes in the Baltic provinces of the Russian Empire (i e, in Courland, Livonia, and Esthonia). As regards the numerical strength of the German element, the latest accessible statistics are those of 1883, in which they are reckoned as forming 1 5 per cent of the population of European Russia If we apply this ratio to the official figures of 1912, when the population of European Russia exclusive of Poland and Finland was stated at 122,551,000, the number of German inhabitants would amount to about 1,800,000

Outside of Europe the largest number of Germans is found in the United States, whose German-born population amounted in 1910 to 2,501,333 For the city of New York alone the census of 1910 gives the German-born population as 278,137 In addition to these we have the Pennsylvania Germans, or Pennsylvania Dutch, whose dialect is still the vernacular of many districts in the State of Pennsylvania An exact count of the Pennsylvania Germans has apparently never been made Their number is by no means identical with that of the Pennsylvanians of German descent There is a large German population in Brazil and Argentina, as well as in Canada and other parts of the British Empire, and there are many Germans scattered in all parts of the world

Altogether German is nowadays spoken by about 80,000,000 people German thus ranks third in number among the four leading languages of Europe—the first being English, the second Russian, and the fourth French

Our figures for German do not include the Dutch language For although Dutch, from a linguistic point of view, represents the Low German branch of the Franconian dialect, it has developed a literary language of its own and therefore is to be regarded as a separate language In like manner Flemish is left out of consideration

On distribution, consult Kiepert, *Uebersichtskarte der Verbreitung der Deutschen in Europa* (Berlin, 1887), Nabert, *Karte der Verbreitung der Deutschen in Europa* (Glogau, 1891, in 8 sections), id, *Das deutsche Sprachgebiet in Europa* (Stuttgart, 1893), Hubner, *Geographisch-statistische Tobellen aller Lander der Erde* (51st ed, Frankfort, 1902)

The German Dialects From the earliest times German has been divided into several dialects Of course, these dialects must not be regarded as representing a corrupted form of the written language On the contrary, they are—in Germany, as elsewhere—the natural and genuine offshoots of the language, whereas the written language represents one of their number artificially restrained in its natural development It is only by drawing constantly on the dialectic vocabulary and by adapting itself more or less to the grammar of the living dialects that the written language succeeds in sustaining its vitality

Except in the territory formerly held by the Slavs, the distribution of the German dialects has within the last 1000 years undergone few changes, and a map of the Old High German dialects may be brought up to date with comparatively slight alterations There is little doubt that dialectic differences were originally the outcome of ethnographical divisions of the German tribes, and since as early as the third century A D we meet with tribal unions, such as the Alemanni, the Franks, and the Saxons, we may date back to this time the origin of the corresponding dialects At first the differences between these dialects were slight, but in the course of several centuries they became more pronounced

One event in the history of the German language is in this respect of special importance—the second, or High German, shifting of consonants This second shifting is similar to the first, which had occurred several centuries earlier, so similar, indeed, that the formula known as "Grimm's law" (q v) applies, with slight modifications, to the second as well as to the first shifting There are, however, some important differences First, while by the first shifting three classes of sounds (the tenues, mediæ, and aspirates) were concerned, the second is limited to only two classes, the tenues *p, t, k*, and the mediæ *b, d, g* Second, while the first shifting is essentially the same in all Germanic languages, the second, or High German, shifting varies from dialect to dialect In some of the dialects the shifting of the tenues and mediæ is almost as systematic as in the case of the first shifting, whereas in others it is con-

fined to only a few among the six consonants concerned

The second shifting began in the seventh century A D It started from the Alps in the most southern region of the German territory and spread with unbroken force over the Alemannic and Bavarian dialects It then advanced, with diminishing energy, farther north into the Franconian territory, making its entry from the southeast and progressing from there along the Main and Rhine rivers. By the time it had reached Cologne most of its energy was spent, and soon afterward, after crossing the 51st degree of latitude, it came to a stop entirely, without reaching the northern Franconian or the Saxon dialects

As a result of the second shifting, we have a clearly defined division of the German dialects into three main groups (the second having various subdivisions), according to the degree in which they have been affected by the shifting

I *Upper German*—The dialects in which the second shifting has been carried out to its full extent They are divided into (1) *Alemannic* (west of the river Lech) and (2) *Bavarian* (east of the Lech) The Alemannic is again subdivided into (*a*) South Alemannic in Switzerland and in the southern districts of Baden and Wurttemberg, (*b*) Alsatian, (*c*) Swabian The subdivisions of the Bavarian are (*a*) Upper Bavarian and Austrian, which constitute the main body of the Bavarian dialect, (*b*) the dialect of the Upper Palatinate (*Oberpfalz*) in northern Bavaria, west of the Bohemian Forest It may be noted that the German dialects spoken in Hungary (especially in the Transylvanian Saxon Land) belong to the Midland, not to the Upper German type It may be inferred from their dialect that these Germans are immigrants from western Germany, and that most of them came from the lower Rhine

II *Midland German*—The dialects which have been affected by the shifting in a lesser degree Among these are

(1) *East Franconian* (the dialect of the old Duchy of Franconia Orientalis), which is of special interest, as it exhibits the shifting in the form in which it has found its way into the literary language of Modern German. The tenues *t* and *p* are shifted in Modern German in two different ways, to *z* and *pf* respectively, both at the beginning of a word and after consonants (e g, Eng *to* = Ger *zu*, Eng *heart* = Ger *Herz*, Eng *penny* = Ger. *Pfennig*, Eng *stump* = Ger. *Stumpf*), and to *zz* (= Mod Ger *ss*) and *ff* after vowels (e g, Eng *eat* = Ger *essen*, Eng *ape* = Ger *Affe*) The tenuis *k* is shifted to *ch* after vowels (e g, Eng *make* = Ger. *machen*), while it remains unchanged when initial (e g, Eng. *can* = Ger *kann*). The dental media *d* is always shifted to *t* (e g., Eng *deal* = Ger *Teil*, Eng *side* = Ger *Seite*), whereas the labial and the guttural mediæ are not affected by the shifting North of the East Franconian we find·

(2) The *Thuringian* dialect, which by the colonization of the former Slavic territory has spread to the east over what is now the Kingdom of Saxony, and the Prussian Province of Silesia, giving rise there to the Upper Saxon, or Misnian (*Meissnisch*), and to the Silesian dialects At an earlier date Thuringian apparently differed but little from East Franconian But in course of time the differences have become more pronounced, especially so if we compare the Upper Saxon and Silesian with the Franconian dialects Thus, it is characteristic of the Saxon dialect that it has almost lost the distinction between voiced and voiceless consonants, so that at present the mediæ *b*, *d*, *g*, are not distinguished in pronunciation from the tenues *p*, *t*, *k* West of Thuringian and East Franconian there follows

(3) *Rheno-Franconian* (the dialects of the former Franconian Rhenensis, of the Palatinate of the Rhine, and of the larger part of Hesse) It is chiefly from the dialect of the Palatinate that the Pennsylvania German in America has developed The shifting differs from that of East Franconian and Modern German, especially in that initial *p* and initial *d* have not been shifted (e g, Eng *pipe* = Penn Ger *paife*, Mod. Ger *Pfeife*, Eng *deal* = Penn Ger *del*, Mod Ger *Teil*) Still more limited is the shifting in

(4) *Middle-Franconian* (the dialects spoken along the banks of the Moselle and of the Rhine from Coblenz to Dusseldorf) Middle Franconian is characterized by the fact that *t* is kept —in accordance with Low German—in a few pronominal forms, while otherwise it is shifted to *z* or *ss*, as in High German We find, therefore, e g, in Cologne *et*, *dat*, *wat* = Eng *it*, *that*, *what*, but *zo* = Mod Ger *zu*, Eng *to*, and *weiss* = Mod Ger *weiss*, Eng *white*

The Upper German and the Midland German dialects are both comprehended under the term "High German," in distinction from the remaining group, the "Low German"

III *Low German*—The dialects which have not been reached by the second shifting These include not only the *Platt*, or *Platt-deutsch*, in northern Germany, but also the dialects of Belgium and Holland (with the exception, of course, of the French and the Frisian districts of the Low Countries) We have two divisions

(1) *Low Franconian*, or the German dialects in the northeastern corner of Rhenish Prussia, and the adjoining Flemish and Dutch dialects in Belgium and Holland.

(2) *Low Saxon*, or the Low German dialects of Westphalia, Oldenburg, Hanover, Brunswick, Holstein, Mecklenburg, and the Prussian provinces of Brandenburg, Pomerania, and East and West Prussia It is to be noted that east of the Elbe, in the former Slavic territory, the Low German has (except in Holstein, Mecklenburg, and Pomerania) generally undergone a mixture with Midland German dialects

The lack of the shifting is, of course, merely a negative criterion, and if we comprehend Low Franconian and Low Saxon under one group, we ought not to overlook the fact that the former was at an earlier date more closely connected with the Franconian dialects in Midland Germany Its vocalism is, in fact, to this day nearer to that of High German and of the Midland German dialects than to that of the Low Saxon

Low Saxon is subdivided into two distinct dialects, Northern Saxon (or Low Saxon proper) and Westphalian, the latter including in addition to the Prussian Province of Westphalia, also the northern portions of Waldeck and Hesse, the whole of Lippe, and part of southern Hanover (e g., Osnabruck) The principal difference between the two lies in the fact that in the Westphalian dialects we find a rather complicated vocalism, and generally an abundance of diphthongs, whereas Northern Saxon has few diphthongs and altogether a very simple vowel system

For a complete list of grammatical treatises and dictionaries on the German dialects down to 1890, consult Mentz, *Bibliographie der deutschen Mundartenforschung* (Leipzig, 1892), for a briefer list, Kauffmann, in Paul, *Grundriss der germanischen Philologie*, i (2d ed, Strassburg, 1901–09) Other works of bibliographical importance are Behagel, *Geschichte der deutschen Sprache* (3d ed, Strassburg, 1911), Weise, *Unsere Mundarten, ihr Werden und ihr Wesen* (Leipzig, 1910), Reis, *Die deutsche Mundarten* (Berlin, 1912), Seemuller, *Deutsche Mundarten* (2 parts, Vienna, 1908) As to poems, fiction, etc, written in these dialects, there is no later attempt at a bibliography than the one made by Carl H Herrmann, in his *Bibliotheca Germanica* (Halle, 1878). Collections of specimens from the various dialects are Firmenich's *Germaniens Volkerstimmen* (3 vols. and appendix, Berlin, 1841–66), very complete and interesting, and Welcker's *Dialektgedichte* (2d ed, Leipzig, 1899), a smaller anthology. Kluge, *Urgermanisch* (Strassburg, 1913) is important for the early history of the language

A dialect map of the earlier periods is found in Piper's *Verbreitung der deutschen Dialekte bis um das Jahr 1300* (Lahr, 1880) For the modern dialects, the maps by Bremer, in Brockhaus's *Konversations-Lexicon*, vol. iv (new 14th ed, Leipzig, 1901, art "Deutsche Mundarten"), and by M Maurimann, in Meyer's *Konversations Lexikon*, vol iv (5th ed, Leipzig, 1894, art "Deutsche Sprache"), will be found the most serviceable A comprehensive dialect map of Germany was undertaken many years ago by G. Wenker After the first number had appeared (Strassburg, 1881) the plan of the work was changed so as to give a separate map to the dialectic forms of a single word. In its present form this *Sprachatlas* will probably not be published, but the single maps are deposited in manuscript in the Royal Library of Berlin. By January, 1902, the number of finished sheets (each three forming one map) amounted to no less than 610. This work has originated a new method for the cartography of living dialects. The dialect map in Paul, *Grundriss der germanischen Philologie* (2d ed, Strassburg, 1901), should be consulted, and also F. Wrede, *Deutsche Dialektgeographie, Berichte und Studien uber G. Wenkers Sprachatlas des deutschen Reiches* (Marburg, 1908), Wenzel, *Studien zur Dialektgeographie der sudlichen Oberlausitz und Nordbohmen* (ib, 1911), Hommer, *Studien zur dialektgeographie des Westerwaldes* (ib, 1910)

Old and Middle High German. In the history of High German three main periods are distinguished Old High German, from the eighth century to about 1100, Middle High German, from about 1100 to 1500, Modern German, from about 1500 to the present time. These periods apply both to dialects and to the literary language It is, however, only in Modern German that the literary language has become distinctly separated from the dialects In Middle High German we have only the beginnings of a literary idiom, while in Old High German there is no trace of a common written language in distinction from the dialects The dates given are meant only to fix roughly the beginning and the end of each period. There is, in fact, no distinct break in the development of the High German language, but rather a gradual transition from one period to the other

Old High German is characterized especially by the preservation of full vowels in its inflectional endings, e g., *nimu, neman, tagum, hano, hanin, zungûn*

In *Middle High German* these vowels are uniformly weakened to *e*, so that, e g, the above words appear in the following form *nime, nemen, tagen, hane, hanen, zungen* Traces of this weakening appear first in the Franconian dialect and become more general towards the end of the eleventh century Many instances of full vowels, however, in inflectional endings are still found in the Middle High German literature of the early twelfth century, so that the period from about 1080 to 1150 may be regarded as a transition period from Old High German to Middle High German

There is, as has been stated, in Middle High German no generally accepted literary language as one is found in the written language of Modern German Thus, Heinrich von Veldeke's language points as clearly to the Low Franconian dialect as does Hartmann von Aue's to the Swabian But, on the other hand, in the case of Wolfram von Eschenbach, who was born in the Franconian portion of Bavaria, it is difficult to determine how far he used his own dialect and how far he gave the preference to the Swabian. Most of the leading poets of this period lived in that part of Germany where the Upper German dialects were found, especially in Alsace, Swabia, Bavaria, and Austria Hence it is only natural that there should have developed in southern Germany a tendency to a certain uniformity in the written language as to grammatical forms and literary expression This does not mean that the Middle High German poems belonging to this group entirely lost their local coloring, it means only that their language rose to a certain extent above the level of the dialects, in that certain dialectic peculiarities were avoided, while others were apparently regarded as unobjectionable The fact, in any case, remains that in the works of Hartmann von Aue, Gottfried von Strassburg, Walther von der Vogelweide, and also in the *Nibelungenlied* and *Gudrun*, we find essentially the same language If we were to identify this language with a single dialect, we should probably call it Swabian, though it has been recently proved that it omits several of the salient features of the Swabian dialect of this period It must therefore be regarded as the literary form of the Swabian dialect, risen to the rank of the literary language of southern Germany generally, though it appears with slight variations in the different provinces

The period of "classical" Middle High German—in other words, the time of the hegemony of literary Swabian—comes to an end in the latter half of the thirteenth century From about 1250 we have a transition period, during which the leadership is gradually passing to the Midland German dialects.

Convenient helps to the study of Old High German are Braune, *Abriss der althochdeutschen Grammatik* (3d ed, Halle, 1900), Wright, *Old High German Primer* (Oxford, 1888), and Braune, *Althochdeutsches Lesebuch* (5th ed, Halle, 1902) The most complete Old High German dictionary is Graff, *Althochdeutscher Sprachschatz* (7 vols., Berlin, 1834–46) This excellent work is unfortunately arranged according to roots, but the seventh volume contains an alphabetical index by Massmann

There are numerous Middle High German

grammars and readers, e g, Wright, *Middle High German Primer* (2d ed, Oxford, 1899), Paul, *Mittelhochdeutsche Grammatik* (5th ed, Halle, 1900), Michels, *Mittelhochdeutsches Elementarbuch* (Heidelberg, 1900), Weinhold, *Mittelhochdeutsche Grammatik* (2d ed, Paderborn, 1883), id, *Mittelhochdeutsches Lesebuch*, Meyer, *Mittelhochdeutsche Uebungsstucke* (Halle, 1909) The standard dictionaries of Middle High German are Benecke, *Mittelhochdeutsches Worterbuch*, ed by Muller and Zarncke (3 vols, Leipzig, 1854–66), Lexer, *Mittelhochdeutsches Handworterbuch* (3 vols, ib, 1872–78), id, *Mittelhochdeutsches Taschenworterbuch* (6th ed, ib, 1901)

Modern German. It is characteristic of the literary language of Modern German that it is based on the Midland German rather than on the Upper German dialects The points in which it differs from the Middle High German "Literary Swabian" are especially these (1) the MHG long vowels *î, û, û* (the latter spelled *iu* in MHG) have been changed to the diphthongs *ei, au, eu*, e g, MHG *mîn* = M Ger *mein*, MHG *hûs* = M Ger *Haus*, MHG. *hiute* = M Ger *heute*, (2) the MHG diphthongs *ie, uo, ue*, have been changed to the long vowels, *î* (spelled *ie*), *û, ü*; e g, MHG *spiegel* = M Ger *Spiegel* (i e, *spīgel*), MHG *muot* = M Ger *Mut*, MHG *behueten* = M Ger *behuten*; (3) the MHG short vowels *a, e, i, o, u*, have been lengthened in stressed "open" syllables (i e, in stressed syllables ending in a consonant), e g, MHG *name* = M Ger *Name* (pron *nāme*), MHG *nemen* = M. Ger *nehmen*, MHG *geblîben* = M Ger *geblieben*, MHG *oben* = M. Ger *oben* (pron *ōben*), MHG *uber* = M Ger *über* (pron *ūber*), (4) initial *s* has passed into *š* (spelled *sch*) before *l, m, n, w*, e g, MHG *slagen* = M Ger *schlagen*, MHG *smerze* = M Ger *Schmerz*, MHG *snîden* = M Ger *schneiden*, MHG *swaere* = M Ger *schwer*, (5) the difference in the strong preterit between the stem vowel of the singular and that of the plural is generally discarded, e g, MHG. *ich bleip, wir blîben* = M. Ger *ich blieb, wir blieben*, MHG *ich half, wir hulfen* = M Ger. *ich half, wir halfen* There are in addition to these differences many others, but those mentioned stand first in importance

In almost every case we are able to trace the origin and the spread of these changes in the Midland German dialects for a long time before they were incorporated in the literary language Of special interest is the diphthongization of Middle High German *î, û, û*, in that this was originally an Austro-Bavarian peculiarity, which spread from Bavaria and Austria over east Franconia and from here over the neighboring Midland German districts

The history of the Modern German written language may be traced back to the middle of the fourteenth century, when, under the Emperor Louis the Bavarian (1314–47), the Imperial Chancery adopted German instead of Latin in its official documents There existed at this time in the different parts of Germany several *Kanzleisprachen*, or official languages The mutual intercourse between the various centres furnished the basis for greater uniformity, and it is only natural that the language of the Imperial Chancery should have gained a predominating influence. The dialect adopted by the Imperial Chancery was essentially that of the Imperial court, which at the time of the Luxemburg emperors (1347–1437) was stationed at Prague It was accordingly a dialect whose consonantism was East Franconian, and in which the Middle High German long vowels *î, û, û* had been replaced by the Austro-Bavarian diphthongs *ei, au, eu* The adoption of this dialect by the Imperial Chancery led to its introduction, in the second half of the fifteenth century, into the chanceries of the neighboring principalities of Saxony and Thuringia A further step was its adoption, between 1480 and 1500, by the Meissen and Saxon municipalities and courts and by the universities of Leipzig and Wittenberg. By 1500 it had become, in Saxony and Thuringia, not only the generally accepted official language, but was also largely used in private correspondence and as the written language among the educated classes

The popular belief which ascribes to Luther the foundation of the Modern German literary language is not well founded When, in 1522, Luther published his translation of the New Testament, he simply made use of a written language which was by this time pretty firmly established Luther's own words bear witness to this, for he says in his *Table Talk* (chap lxix) "I have no particular language of my own in German, but use the common German language so that both High and Low Germans may understand me I follow the language of the Saxon Chancery, which all the princes and kings in Germany take as their model, all the free Imperial cities and all the courts of princes write according to the Chancery of the Saxons and of our prince Hence it is the most common German language Emperor Maximilian and the Elector Frederick, Duke of Saxony, have thus united into one fixed language the German languages of the Roman Empire" This much is true, that Luther's translation of the Bible, his catechisms, his hymns, and his numerous pamphlets were largely instrumental in spreading this language from midland Germany over the whole of the German Empire and in overcoming the obstacles which for a long time militated against its acceptance as the written and literary language of all Germany The latter result was achieved in the course of the sixteenth and seventeenth centuries, when first (between about 1550 and 1600) northern Germany, afterward southern Germany, and finally Switzerland, joined the movement It is hardly before about 1750 that the literary language can be said to have received its present form

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GRAMMARS (*a*) Historical, Grimm's *Deutsche Grammatik* (4 vols, rev ed, Berlin, 1870–78) is rather a comparative grammar of the Teutonic languages, Wilmanns, *Deutsche Grammatik*, vols i and ii (2d ed, Strassburg, 1897–99), vols iii and iv have not yet appeared. (*b*) Practical Blatz, *Neuhochdeutsche Grammatik* (2 vols, 3d ed, Karlsruhe, 1895–96); Sanders, *Worterbuch der Hauptschwierigkeiten der deutschen Sprache* (24th ed, Berlin, 1892), a gram-

mar in alphabetical order, Wright, *Historical German Grammar* (London, 1907), Mozer, *Historisch-grammatisch Einfuhrung in die fruhneuhochdeutschen Schriftdialekte* (Halle, 1909), Sutterlin, *Grundriss der deutschen Sprachlehre* (3d ed, Leipzig, 1911), Thomas, *A Practical German Grammar* (New York, 1905), Bierwirth, *The Elements of German* (ib, 1900), Harris, *German Lessons* (Boston, 1892)

DICTIONARIES (*a*) Historical and etymological Grimm, *Deutsches Worterbuch* (Leipzig, 1854 et seq.), will consist of 16 volumes (counted as vols i–xiii), of which 14 have appeared (the last dated 1911), Sanders, *Worterbuch der deutschen Sprache* (3 vols, ib, 1860–65), the *Erganzungswoterbuch der deutschen Sprache* (Berlin, 1885), by the same author, is a supplement to the preceding, *Moment-lexikon und Fremdworterbuch* (new ed, ib, 1909); Heyne, *Deutsches Worterbuch* (3 vols, Leipzig, 1890–95), id, *Deutsches Worterbuch, Kleine Ausgabe* (in 1 vol, ib, 1896), *Allgemeines verdeutschendes und erklarendes Fremdworterbuch* (19th ed, Hanover, 1911), Schulz, *Deutsches Fremdworterbuch* (Strassburg, 1910–11), Kluge, *Etymologisches Worterbuch der deutschen Sprache* (7th ed, Strassburg, 1910, Eng trans of the 4th ed, London, 1891), Weigand, *Deutsches Worterbuch*, ed by Hirt (2 vols, Giessen, 1909-10) (*b*) Practical Flugel, *Universal English-German and German-English Dictionary* (4th ed, 3 vols, Brunswick, 1891), and Muret, *Encyclopædic English-German and German-English Dictionary* (2 vols, Berlin, 1908), are the two most comprehensive English-German dictionaries Other works are Flugel-Schmidt-Tanger, *Dictionary of the English and German Languages* (8th ed, Brunswick, 1909), and the new edition, by Schröer, of Grieb's *English-German and German-English Dictionary* (10th ed, Stuttgart, 1898–1902; all the editions of Grieb previous to this one are antiquated), Sattler, *Deutsch-Englisches Sachwörterbuch* (2 vols, Leipzig, 1904–05). Among the one-volume dictionaries the one by Weir (Cassell's *New German Dictionary*, London, 1888, identical with Heath's *New German Dictionary*, New York, 1906), and Whitney-Edgren, *Compendious German and English Dictionary* (ib, 1905), deserve special mention For etymology, besides the work of Kluge mentioned above, Hirt's *Etymologie der neuhochdeutschen Sprache* (Munich, 1909) should be consulted

Spelling and Pronunciation. Germany has an orthographical problem of her own, although a less complicated one than England and America. The spelling of Modern German had become pretty well settled in the latter half of the eighteenth century, when Gottsched (*Deutsche Sprachkunst*, Leipzig, 1748) and Adelung (*Anweisung zur deutschen Orthographie*, ib, 1788) were the chief authorities, and there were only slight changes (due especially to the grammatical works of J Chr. A Heyse) in the early nineteenth century. More recently, however, when the works of Jakob Grimm and his followers had led to a better understanding of the history of the German language, and when phonetics had become an essential element in the study of grammar, a more radical reform than that attempted by Heyse was advocated by many scholars Opinions, however, differed as to whether the reform should rest primarily on an historical or a phonetic basis The uncertainty in orthographical matters was on the increase, and in 1876 the Prussian government decided to call to Berlin a conference of German philologists, principals of schools, and publishers This conference had no immediate practical outcome though its transactions were instrumental in clearing the way for subsequent regulations Four years later the Prussian Minister of Instruction (Von Puttkamer) introduced in the Prussian schools a uniform spelling, the rules for which are contained in the *Regeln und Worterverzeichnisse fur die deutsche Rechtschreibung* (Berlin, 1880) This *Preussische Schulorthographie*, however, could only mean a temporary solution of the difficulty Its rules were often (e g, as to the use of *th* and *t*) complicated and generally of such a character as to satisfy neither the conservatives nor the advocates of reform It became finally necessary for the Prussian government to call at Berlin in 1901 a second conference, in which the southern German states and the Austrian and Swiss governments were also represented The result is the revised edition (*Neue Bearbeitung*) of the above-mentioned *Regeln und Worterverzeichnisse* (Berlin, 1902) The new regulations are simpler than the former ones, although they imply more radical changes They have been introduced in both German and Austrian (and also Swiss) schools and have at the same time been adopted by most of the leading newspapers There is every prospect that for all practical purposes the problem of spelling has been successfully solved for a long time to come

With the pronunciation of German the case is different Neither has there been nor is there at present, a generally recognized standard pronunciation, so that in this respect the union of northern and southern Germany is not yet perfected In southern and midland Germany the difference between the literary language and the dialect is not fundamental enough for the two to be treated as different languages. We find, therefore, that the pronunciation even of cultured people is almost always more or less tinged by their native dialect The Swabians, the Swiss, the Austrians, and the Saxons are, as a rule, easily recognized by their pronunciation In northern Germany the Low German dialects and the literary idiom are regarded as different languages But as High German here has been for several centuries the language of the educated classes, it has again developed local peculiarities and dialectic differences of its own.

It is claimed by many that the language of the theatre—which, if not entirely so, is, on the whole, uniform throughout Germany—must be regarded as dialect-free and as the standard pronunciation This contention, however, is contradicted by others, who maintain that the pronunciation of the stage, while essentially southern German, is partly based on arbitrary regulations, and that it has no legitimate claim to the position of a standard pronunciation outside of the theatre It is not very likely that the question of pronunciation will be satisfactorily settled within the present generation

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1910) Other works of value are the following Kluge, *Unser Deutsch, Einführung in die Muttersprache* (2d ed, Leipzig, 1910), Delbruck, *Synkretismus, ein Beitrag zur germanischen Kasuslehre* (Strassburg, 1907), Gutjahr-Probst, *Die Anfänge der neuhochdeutschen Schriftsprache vor Luther* (Halle, 1910), Ladendorf, *Historisches Schlagwörterbuch* (Strassburg, 1906), Lambert, *Handbook of German Idioms* (New York, 1910), Buttner, *Die deutsche "Staatssprache"* (Greifswald, 1909), Uhl, *Entstehung und Entwicklung unserer Muttersprache* (Leipzig, 1906) For style and versification see Engel, *Deutsche Stilkunst* (10th ed, Vienna, 1911), Kaufmann, *Deutsche Metrik* (new ed by Vilmars and Grein, Marburg, 1907), Saran, *Deutsche Verslehre* (Munich, 1907), Unser, *Ueber den rhythmus der deutschen Prosa* (Freiburg, 1906) For Low German, consult Grimme, *Plattdeutsche Mundarten* (Leipzig, 1910), and Grube, *Plattdeutsches Wörterbuch* (Berlin, 1908), Braune, *Ueber die Einigung der deutschen Aussprache* (Heidelberg, 1904), Dent, *Deutsche Laute* (London, 1909), a chart of sounds, Piquet, *Précis de phonétique historique de l'allemand* (Paris, 1907), Vietor, *Deutsches Lesebuch in Lautschrift* (Leipzig, 1911), Grossmann, *Practical Guide to German Pronunciation* (New York, 1910), Vietor, *Die Aussprache des Schriftdeutschen* (7th ed, Leipzig, 1909)

GERMAN LITERATURE First Period (600–800). German literature, as distinct from such Teutonic literature as the Gothic Bible translations of Ulfilas, begins after the triumphs of the great migration and the conquest of the Empire Forces that had been engaged in the struggle for dominion turned, about the year 600, to the glorification of the nation's heroes, almost at the same time that similar conditions were forming the Anglo-Saxon epic in England But these songs of warrior gods and heroes are now wholly lost, except a few late recorded fragments, such as the *Hildebrandslied* Then, with the segregation of the High Germans and their partial conversion, literary activity was largely absorbed by the Church and its interests and from having been national became general, catholic That there must have been a considerable body of German poetry in this period, both in Upper and Lower Germany, is made probable by allusions in Latin authors The central figures around whom the saga cycles gathered were Ermenrich (Ermanaricus), a Gothic king of the fourth century, Theodoric the East Goth, Attila the Hun, the Burgundian Gunther (Gundicarius), and, probably a little later and farther to the north, Siegfried, whom some, however, have thought possibly identical with the Arminius who defeated the Roman legions under Varus All these sagas, or elements from them, seem to have been connected with one another before the close of the first period The number of these epic songs was sufficient to suggest to Charles the Great the possibility of collecting them, and he gave orders to that effect. Of the result no trace has survived

Second Period (800–1100) *General Character*—The new temper shows itself in visions of judgment (*Muspilli*), lives of saints, epic gospel narratives (*Heliand*), or the gospel harmonies of *Otfried*, with an occasional monastic excursion into the political field (*Ludwigslied*) But already under the Ottos the national spirit was reviving, and Frederick Barbarossa made the people once more conscious of a national mission that found a literary impulse in contact with the culture of the West and South through military expeditions and of the East through the Crusades This appears first in the religious epics of the eleventh century (*Judith*, *Exodus*), legends of the various Marys, and episodes in the life of Christ German literature of this period hardly equals in interest or literary value that produced in contemporary England or France, but there are signs, especially at the close of the eleventh century, of a refining of the national taste

Of political ballads we have first the *Ludwigslied*, written late in the ninth century to celebrate a victory of Louis III over the Normans and a song celebrating the reconciliation of Otto I and his brother Henry, and there are also clear traces of others on the romantic adventures of the rebellious Duke Ernst of Swabia, a popular hero for his resistance to Conrad II A long Latin epic on Walter of Aquitania (the *Walthariuslied*), telling of his flight with his bride from the court of Attila and his combat with King Gunther at Worms, attests a German original In all these the native spirit dominates, as the old pagan superstitions do in a few songs, such as the Merseburg incantations But, as is natural, the chief survivals of the writings of this time are from the poems with which churchmen sought to supplant the older sagas and to tame the national spirit Best of these is the Low German or Old Saxon *Heliand* (Saviour), written in alliterative verse, apparently by a Saxon and at the request of Louis the Pious The gospel narrative is followed, but Christ becomes a German prince, the disciples are His thanes, and the local color is often naively Teutonic Otfried's *Krist*, with the same theme, is High German and therefore more sophisticated, more didactic also It is the first German rhymed verse The *Muspilli*, which is Bavarian, is of a more independent fancy in its apocalyptic vision, it retains the alliteration of the saga epic and mingles Christian and pagan elements in a way that strikingly illustrates the popular religious conceptions of High Germans of the ninth century The most noteworthy German writer in Latin of this period was Notker Labeo (died 1022), a philosophic monk of Saint-Gall, a translator of Aristotle and Boethius The first and second periods are usually called Old High German

Third Period (1100–1300) *General Character*.—The effect of the Crusades was twofold They revived epic memories of Charlemagne and Roland and of the triumphs of Alexander The response in Germany was immediate Before 1130 there was a *Rolandslied* and an *Alexanderlied* Tales of German adventure soon followed (*Rother*, *Herzog*, *Ernst*, *Orendel*) Political, intellectual, and literary horizons widened together under the rule of Frederick II, and German literature blossomed into its first classical period. Growing ever more self-conscious, more national, during the closing years of the twelfth century, it greets us on the threshold of the thirteenth with its Iliad, the *Nibelungenlied*, and its Odyssey, the *Gudrun* In these folk epics the people speak, meantime the court circle is giving us the philosophic epics of Wolfram von Eschenbach, the popular poetic tales of Gottfried of Strassburg and Hartmann von Aue, the stirring political songs of Walther von der Vogelweide, and the melodious chorus of the Minnesingers.

The forerunners of these court poets were Lambrecht, Conrad, and Heinrich von Veldeke Their successors show a rapid decline due to overproduction and artificiality Literature begins to yield in interest to history, form to matter, and lyric poetry follows close in the wake of the epic decline, so that by 1300 chivalrous love poetry is dead in Germany There is in the treatment of the chivalric epics the same confusion of persons and their dates that is indicated in the remains of the earlier period It was an age of awakening that found its first strong national voice in Heinrich von Veldeke, and it is not by chance that the recognition of his poetic primacy is associated with the Whitsuntide of 1284, when 70,000 German knights gathered at Mayence as guests of Barbarossa at the knighting of his sons That event was an epoch in the national life, and the place that Veldeke won there by his *Eneide* marked no less an epoch in German heroic verse But from this time Latin sources of inspiration proved less congenial than the Franco-Celtic, and from that time the court epic deals prevailingly with legends of Arthur, of the Grail, and of Charles the Great.

The masterpieces of the third period are embraced within 30 years (from 1190 to 1220). Here is found the work of Hartmann von Aue (q.v.), Gottfried von Strassburg (q v), Wolfram von Eschenbach (q v), and Walther von der Vogelweide (q v.) Here, too, belong the popular epics *Gudrun* (q v) and the *Nibelungenlied* (q v) The outburst was natural and spontaneous, all classes shared in it The *Heldenbuch*, compiled and in part written in the fifteenth century by Kaspar von der Rhon, is but a working over of the epic wealth of this earlier period And among the Minnesingers the great Walther had worthy though unequal compeers in Heinrich von Morungen, Reinmar der Alte, and Gottfried von Neifen. Beginning in imitation of the troubadours, they attain soon to a genuine expression of lyric emotion, and to originality of form which is sometimes artificial, but seldom without witness to a sense of beauty and a keen appreciation of melody, which is as surprising in the suddenness of its diffused manifestation as it is in the speed of its decline.

With the second quarter of the thirteenth century artificiality gains the upper hand in Ulrich von Liechtenstein (died 1255), and vulgarity in Neidhard von Reuenthal (died 1240), and in Tannhäuser (died 1270) the dignity of lyric poetry is sacrificed wholly to a rather coarse spirit of comedy The seriously minded express themselves didactically Here, again, the best are first. Freidank's *Bescheidenheit*, the *Walsche Gast* of Thomasin von Zirclaere, show a lofty ideal of morality not without a touch of enthusiasm Their successors—Reimar von Zweter, Heinrich Fruenlob, Hugo von Trimberg, the anonymous collection *Der Winsbecke*, and the didactic *Krieg auf der Wartburg*, a supposed tournament of poets of an earlier age—all tend to the commonplaces of "proverbial philosophy" This change marks a shifting in social ideals Knighthood had become less important, knights less able, perhaps less willing, to be patrons of song. The Minnesingers (q v.) are becoming Meistersingers (q v). Nuremberg, a trading city, is to become the literary centre, and to apply to poetry the commercial and economic spirit by which it had won political recognition. Prose begins to claim a place in the sermons of Brother Berthold (died 1272), of Regensburg, the greatest orator of the century, and codes of local law, *Sachsenspiegel* and *Schwabenspiegel*, are formulated in the mother tongue

Fourth Period (1300–1624) In Germany as in France the fourteenth century shows a shifting in political life that is reflected in literature Its beginning is aristocratic, at its close it is as distinctively bourgeois, though artificial still This shifting is marked by the rise of the free cities and their literary guilds and Meistersingers This is the century also of the founding of the first five German universities—Prague (1348), Vienna (1365), Heidelberg (1387), Erfurt (1392), which exist to-day, and Cologne (1388), since abandoned—whose influence was more favorable to scholasticism than to literary art Life grew more serious, more realistic The drama is its chief field (Hans Sachs) Social and political satire is cultivated (*Reinhart der Fuchs*) Didactic poetry (Sebastian Brant) and prose narrative (*Eulenspiegel*) are often crassly realistic The scholarship of Germany expresses itself chiefly in Latin "This whole period, extending into the seventeenth century, produced no poetic work of art that could satisfy even elementary demands in purity of form" (Scherer)

In prose, on the other hand, the early fourteenth century counts three great preachers—Meister Eckhart (died 1328), Heinrich Suso (died 1366), and Johannes Tauler (died 1361)—mystics all Eckhart was distinguished for the boldness and originality of his speculations, Suso for his chivalrous, if not quixotic, devotion to transcendental truth, Tauler for the sanity of his sanctity All found readers, and each in his way helped to prepare Germany for the Reformation and for Luther Narrative prose chronicles were now written in German and lay open to all readers The Limburg Chronicle (1336–98), the Alsace Chronicle (1386), and the Thuringian Chronicle (about 1430) have some literary as well as historical significance, and suggest the gradual preparation of Germany to welcome and use the invention of printing With it came the revival of classical studies. New universities were founded in the course of the fifteenth century at Rostock, Greifswald, Tubingen, and Leipzig The Humanists, though they wrote almost wholly in Latin, become a force to be reckoned with in German culture The restlessness of the people under the tyranny of princes and the abuses of the Church is witnessed by swarms of little tales in prose and verse, *Volksbucher*, miracle plays, Shrove Tuesday plays (*Fastnachtsspiele*), and polemic satire, of which the most striking examples are Thomas Murner and Geiler von Kaysersberg, both popular preachers In such a period Emperor Maximilian's (died 1519) attempt to revive the taste for romance by the autobiographic *Weisskunig* and by *Theuerdank* (written at his suggestion by Melchoir Pfintzing) was foredoomed to failure

The literature of the Reformation period in its intensity of purpose sacrifices all charm and grace of form. It is a literature of combat, direct, trenchant Luther's Bible is its great monument To this literature Germany owes the inestimable advantage of a common speech. Ulrich von Hutten is the satirist of the Reformation in verse and dialogue, ardent, bold, an enthusiast of political and religious emancipation. He was chief among the authors of the cleverest satire of

the period, the *Epistolæ Obscurorum Virorum* Allied to Hutton in aim, but with greater scholarship, was Johannes Fischart, translator of Rabelais, with whose spirit he had a strong affinity, preferring prose to poetry as a vehicle of thought and molding words to his purpose with singular freedom Other prose writers of the sixteenth century were the artist Durer (q v), the historians Thurnmeier (died 1534), Sebastian Franck (died 1545), and the Swiss Tschudi (died 1572), the Catholic theologian Agricola (died 1566), more noted for his collection of German proverbs, the Protestant Reformer Zwingli (died 1531), and later the successors of the religious mystics, Johann Arndt (died 1621) and Jakob Boehme (died 1624)

In poetry the sturdiest figure of the Reformation period is Hans Sachs (q v), who, as well as Fischart, wrote secular verse also *Reineke Fuchs* was imitated by Rollenhagen in *Der Froschmeuseler* The drama was very widely cultivated as a means of polemic and popular appeal alike by the Catholics and Reformers, the Humanists and the vulgar The noblest poetic expression of the time is, however, its religious lyric Many hymns of Luther, a few of Hans Sachs, Nicolaus Hermann, Paul Ebers, and Philip Nicolai, still survive in popular use. These hymns were second only to Luther's Bible in their appeal to the national heart

Fifth Period From Opitz to Klopstock (1624–1748) The recreation of literature after the Thirty Years' War was begun in the pedantic spirit of Opitz by a literary society of university men, chiefly at first in Hamburg and Leipzig The names that emerge from the general mediocrity are those of the religious poet Gerhardt (1607–76), the novelist Grimmelshausen (1625–76), and towards its close the critic Gottsched (1700–66), whom this period leaves engaged in a controversy with the heralds of the new period, Bodmer (1698–1783) and Breitinger (1701–76) at Zurich, as to whether French or English poets were the more worthy of imitation, since it was admitted that one must imitate somebody This period closes, or rather the classical period begins, with the publication of the first cantos of Klopstock's *Messias* (1748)

The Thirty Years' War deferred the development of the national consciousness which the Reformation had promised For political or social aspirations the conditions were unfavorable, as they were also to the spread or even the maintenance of culture It was natural that men of a literary cast of mind should take refuge in the consolations of pietism and should express their emotions in religious lyric Besides Gerhardt the chief Protestant hymn writers of the seventeenth century are Johann Rist (died 1667), Joachim Neander (died 1688), and Louise of Brandenburg, wife of the Great Elector (died 1667) The best Catholic lyrist is the Jesuit Friedrich Spee, whose work belongs to the war period, for he died in his prime in 1635

Secular poetry either sinks into vulgarity or loses touch with the people through academic affectations First of the pedantic academics was the Fruchtbringende Gesellschaft, formed on the Della Cruscan model under the patronage of Leopold of Anhalt-Dessau (1617) This found fashionable imitation, and even in bourgeois Nuremberg the Pegnitzschäfer displaced the ancient order of Mastersingers in popular regard. The first noteworthy poets to arise in these academic schools were Weckherlin (died 1653) and Opitz (died 1639) The appearance of the latter's prosodical treatise, *Von der deutschen Poeterei* (1624), is sufficiently epoch-marking to form the starting point of a period It was the trusted guide of several generations of verse makers Among his followers, the Silesian school, the chief are Paul Fleming (died 1640) and Andreas Gryphius (died 1664), who extended the principles of Opitz to the drama and was first to introduce the "regular' five-act tragedy to Germany To the Silesian school may be assigned also the epigrammatist Logau (died 1655) and the psalmist Joachim Rachel (died 1699) The Low German humorist Lauremberg (died 1659) may be named also, and Philip von Zesen (died 1689), who founded in Hamburg an academic literary association, Deutschgesinnte Gesellschaft, to cultivate linguistic purity

The first Silesian school, the puristsl, was succeeded by a second, the euphuists, or better, "Marinists," disciples of the extravagant Italian stylist Marino The first impulse to this aberration came from Nuremberg and the Pegnitzschafer Its noteworthy names are Hoffmannswaldau (died 1679) and Lohenstein (died 1683) A little later French influence asserts itself, and Boileau finds disciples of his *Art poétique* in Canitz (died 1699), Besser (died 1729), and König (died 1744)

Of the prose of this period Grimmelshausen's *Simplicissimus* (1668) has almost alone asserted successfully a right to live But besides this satirical novelist of the Thirty Years' War may be named Moscherosch (1601–69), for his imitation of the satires of Quevedo, the historians Sigmund von Birken and Gottfried Arndt, the Persian traveler Olearius, the eccentric Protestant pastor Schupp, and the priest Abraham a Sancta Clara, and the voluminous but unreadable romance writers, Buchholtz, Von Ziegler, and Duke Anton Ulrich of Brunswick, to be followed by multitudinous "Robinsonaden," in imitation of Defoe's masterpiece

As before the Reformation, so at the turn of the century, it is the preachers and religious, metaphysical, or pietistic thinkers who give the first promise of intellectual revival With the pietists Spener (1635–1705) and August Hermann Francke (1663–1727) comes Leibnitz (1646–1716), the brilliantly original philosopher, who wrote as well in German as in French or Latin More prosaic was his disciple Wolf (1679–1754), who wrote in German, and the popularizer Thomasius (1655–1728), editor of the first German magazine and commendable for his successful agitation against the juridical persecution of witchcraft Meantime Nature was timidly reasserting her rights in poetry in the epigrams (1697) of Wernigke, and the lyrics of Gunther (1695–1723), while Brockes (1680–1747) directed the attention of his countrymen from the French to the English poets by precept and by example He translated Thomson's *Seasons* A revival of classical studies may also be noted, but it is to England that the literary youth of Germany is looking at the close of this fifth period

Sixth Period From the *Messias* to the death of Goethe (1748–1832) The reign of Frederick II represents a progress in German letters and æsthetic taste that is hardly paralleled in history. When he came to the throne (1740), Herder (1744–1803), Goethe (1749–1832), Schiller (1759–1805), and Richter (1763–1825)

were not yet born, Wieland (1733–1813) was a child of seven, Lessing (1729–81) a boy of 11, Klopstock (1724–1803) a youth of 16, Gellert (1715–69) a young man of 25 When he died (1786), Lessing had closed his epoch-making career, Wieland, Herder, and Klopstock had passed their zenith, Goethe had completed the first period of his unchallenged mastery, and Schiller was becoming his worthy compeer Here, as in the third period, a revival of national pride led to a revival of national literature The Seven Years' War made Prussia a rallying point of German national feeling, such as had not existed for centuries

Noteworthy poets contemporary with the youth of Klopstock are the descriptive, didactic, and scientific Haller (1708–77) and the genial narrative and lyric verse writer Hagedorn (1708–54) The Leipzig school of criticism, led by Gottsched (1700–66), continued its conservative protest alike against the Anglophile school of Zurich, headed by Bodmer (1698–1783) and Breitinger (1701–76), and the amiable and popular Gellert (1715–69), chief representative of the younger writers of Leipzig Noteworthy among the forerunners of the classical period are the satirist Rabener (1714–71), the epigrammatist Kastner (1719–1800), the essayist Cramer (1752–1807), imitator of Steele, and C. F Weisse (1726–1804), first to make successful literary appeal to German youth and childhood

The new literary life is first fully felt in Gleim's (1719–1803) *Lieder eines preussischen Grenadiers* (1758) Associated with Gleim in what is known as the Halle school were Uz (1720–96) and Götz (1721–81), the literary connection with these of the poet of nature, Ewald von Kleist (1715–59), of Ramler (1725–98), a martial lyrist, of Holtz (1748–76), and of the idylist Gessner (1730–87), is less intimate The religious lyric tradition is meantime continued by Von Zinzendorf (1700–60)

Klopstock meantime gave copious utterance to the subjectivity and sentimentalism of his generation, but did more for poetic technique than for public taste The whole tendency of Frederick's influence, direct and indirect, was to turn away from sentimental enthusiasm and pietistic mysticism towards realistic study and practical activity This appears strikingly in the popular philosophic movement, which derives in part from the French encyclopædists, but more from Shaftesbury and Locke Its leaders were Moses Mendelssohn (1729–86) and Friedrich Nicolai (1733–1811), both of Berlin, with whom it is convenient to associate Thomas Abbt (1738–66), Georg Sulzer (1720–79), and Johann Engel (1741–1802) Among the popular historians Moser (1720–94) deserves note, and in art criticism Johann Winckelmann (1717–68) and Christian Gottlieb Heyne (1729–1812)

All these belong in their cast of mind to the forerunners of the classical generation The full force of the inspiration and emancipation that came from the triumphs of Frederick II to the German literature that he affected to despise first appears clearly in the development of the genius of Wieland (1733–1813), who in educating Duke Karl August of Weimar gave the new literature a genial home and kindly fostering Meantime the sterner spirit of Lessing was breaking down and building up in æsthetics the drama, philosophy, and religion. The authors and scholars of Weimar and the neighboring Jena entered into his labors through Herder (1744–1803), while the young Goethe brought hither the fresh sap of the springtide of "Storm and Stress" to be clarified and strengthened before it was itself revivified by Italian naturalism But the effervescence is in no way confined to Weimar or to Lessing and Goethe One feels it seething in the young Schiller, in Lenz (1751–92), Burger (1747–94), Klinger (1752–1831), Wagner (1769–1812), Leisewitz (1752–1806), and in the multitude who thought themselves geniuses of a *Geniezeit* Of cardinal importance to the writers and the æsthetics of the succeeding decade was Kant (1724–1804), by his *Critique of Pure Reason* (1781), who, as well as his successors, Fichte (1762–1814), Schelling (1775–1854), Hegel (1770–1831), rivaled the writers of imaginative literature in their claim on the attention of all serious minds.

With Goethe's return from Italy (1788) there comes a movement towards classicism, order, correctness, repose, or at least restraint In inaugurating this Goethe continues the work of Lessing, and after six years wins the cooperation of Schiller A classical school is formed, while around these play the chartered libertines of genius, with Richter (1763–1825) as their leader, and usher in the Romantic school, whose rise and decline Goethe lived to witness The history of this school resolves itself into a struggle to turn the objective idealism of the classicists into a subjective one, that set the imagination to overcome reality To realistic and plastic antiquity they opposed the fantastic Middle Ages and the opulent fancies of the East In philosophy this school substitutes the mystic or ironical idealism of Fichte and Schelling for the rationalism of Kant The leaders here are the Schlegels (q v), the Brentanos (q v), Novalis (q v) (1772–1801), Von Arnim (q v) (1781–1831), Tieck (q v.) (1773–1853), Eichendorff (q v) (1788–1857), Fouqué (1777–1843), Chamisso (q v) (1781–1838), Hoffmann (q v) (1776–1822), and on the borderland of the movement the dramatist Heinrich von Kleist (q v) (1777–1811), the Platonic theologian Schleiermacher (q v) (1768–1834), the novelist Hauff (1802–1827), the patriot poet Uhland (q v) (1787–1862), and the brothers Grimm Several of these outgrew their romanticism, and when Goethe died it had become more a thing of the past than even the classic realism against which it had rebelled Heine claimed justly to be at once the last Romantic lyrist and the first of the modern school Among the lesser writers of the turn of the century there may be named the once famous idylist and still respected translator Johann Voss (1751–1826), the poet Mathias Claudius (1740–1815), the sentimentalist Jung-Stilling (1740–1817); the lyric imitators of Schiller, Matthisson (1767–1831) and Salis-Seewis (1762–1834), Platen (1796–1835) as master of metrical technique, the popular and prolific dramatists Iffland (1759–1814) and Kotzebue (1761–1819), the philosophical sentimentalist Friedrich Jacobi (1743–1819), Werner (1768–1823), who earned transitory fame for "tragedies of fate" and found imitators in Mullner (1774–1829), Houwald (1778–1845), and even the young Grillparzer (1791–1872), the patriot poets Korner (1791–1813), Arndt (1769–1860), and Ruckert (1788–1866) Among the more distinguished literary scholars of the period may be named the historians Spittler

(1752–1810), Johannes von Muller (1752–1809), Schlosser (1776–1861), Niebuhr (1776–1831), and Von Raumer (1781–1873)

Seventh Period From Heine to Hauptmann (1832–1900) This period, though excluding the earlier work of Heine, embraces that which entitled him to be called "the continuator of Goethe" It was Heine that transferred into the political and social field the activity of Goethe in a literary one and perceived more clearly than any other in Germany the hollowness of inherited social conditions In an age of democratic upheaval he bore the banner of revolutionary reform, and as he grew more realistic he came more in touch with the questioning dissatisfied spirit of an age that had parted from its old ethical moorings and had not yet found a new anchorage He was less positive therefore than Goethe, but "incomparably the most important figure of that quarter of a century that follows Goethe's death" (Matthew Arnold) His influence can be seen in almost every field, though what he wrought by lyric poetry has come to be more and more the function of the novel and of drama The more noteworthy poets of the generation preceding the Franco-German War and the foundation of the German Empire were Freiligrath (1810–76), Von Dingelstedt (1814–81), Kinkel (1815–82), Von Redwitz (1823–91), Anastasius Grun (1816–76), Scheffel (1826–86), F W Weber (1813–94), Simrock (1802–76), Jordan (1819–1904), Bodenstedt (1819–92), Lingg (1820–1905), Geibel (1815–84), Fontane (1819–98), and the poet composer Wagner (1813–83)

Fiction in this period shows a blending of that of Wieland, of Goethe, and of Schlegel But from its beginnings it is, as a result of the French upheaval of 1830 and the Romantic movement there, predominatingly social, especially after the German movement of 1848 The "Young Germany" of 1833–35, begun by Wienbarg, headed by Gutzkow, supported by Laube and Borne, was essentially political With Heine and the women Rahel Varnhagen, Bettina von Arnim, and Charlotte Stieglitz it tended to a strike for social freedom, for "the emancipation of the flesh," and this is strongly marked in the earlier novels of Luise Muhlbach (1814–73), Luise Ashton, Ida Frick, Ida Hahn-Hahn (1805–73), Fanny Lewald (1811–89), and in her younger days Marlitt (1825–87). These emancipationists make of the novel a political pamphlet, though there was some reaction after 1848, fiction turning for a time from the political to the purely literary field, and to the historical novel, of which Alexis (1798–1871), Spindler (1796–1855), Laube (1806–84), and Scheffel (1826–86) were the chief representatives.

The serious drama in the period before the Franco-Prussian War is best represented by Gutzkow (1811–78), Laube (1806–84), Hebbel (1813–64), Mosen (1803–67), and Heyse (1830–1914) Melodrama is represented by Friedrich Halm (1806–71), Charlotte Birch-Pfeiffer (1800–68), and Salomon von Mosenthal (1821–77); comedy by Freytag (1816–95) and Benedix (1811–73) The most distinguished critic of the period is Gervinus (1805–71), its best-known historians, Menzel (1798–1873), Von Ewald (1803–75), and later Mommsen (1817–1903), Ranke (1795–1886), Droysen (1808–84), and Ernst Curtius (1814–96). The most renowned scholars of this period were the brothers Jakob (1785–1863) and Wilhelm Grimm (1786–1859) In formal philosophy its most distinguished names are Schopenhauer (1788–1860), Lotz (1817–81), Ulrici (1806–84), Ueberweg (1826–71), Schwegler (1819–57), Kuno Fischer (1824–1907), and Von Hartmann (1842–1906)

In the generation following the Franco-Prussian War antiquarian fiction was cultivated by Ebers (1837–98), while the tradition of the national and political novel was continued in the work of Dahn (1834–1912) and Freytag (1816–95), Meyer (1825–89), Gottschall (1823–1909), and a numerous group of minor writers among whom Spielhagen (1829–1911) is chief Romanticism is continued in G Keller (1819–90), Storm (1817–88), and Marlitt (1825–87), and the naturalistic movement makes itself felt in Heyse (1830–1914), Wilbrandt (1837–1911), Sudermann (1857–), Paul Lindau (1839–), and in its extreme form in Mauthner (1849–), Ring (1817–1901), and Kretzer (1854–), while Jensen (1837–1911) and Marie von Ebner-Eschenbach (1830–) represent a psychologic school, and in Aloisia (Lola) Kirschner (1854–) and Baroness von Suttner (1843–1914) the social and democratic interest is again obvious As an offshoot of this last, we have the village fiction of Auerbach (1812–82), Anzengruber (1839–89), Rosegger (1843–), and Raabe (1831–1910) Exotic sensation is cultivated by Franzos (1848–1904) and Sacher-Masoch (1835–95), and urban humor by Stinde (1841–1905) and Eckstein (1845–1900) The most powerful writers of fiction during the period are Heyse, Dahn, Ebner-Eschenbach, C F Meyer, and Freytag

The patriotic lyrists of the new Empire were many One may note Geibel and Redwitz, Becker (1828–91), and Jensen (1837–1911) More detached from politics are Heyse and Baumbach (1840–1905) and the peasant poet Johanna Ambrosius (1854–) The epic tradition is continued by Julius Wolff (1834–1910), and intransigent innovation in epic form is attempted by Bliebtreu (1859–), Holz (1863–), Heinrich Hart (1855–1906), and his more talented brother Julius (1859–)

In historical drama, besides Heyse, Wildenbruch (1845–1909), Greif (1839–1911), and Wilbrandt (1837–1911) were striking writers, in melodrama, Ganghofer (1855–), and for the peasant drama, Anzengruber (1839–89) Comedy, largely French in technique and commercial in spirit, was cultivated by L'Arronge (1838–1908), Paul Lindau (1839–), Blumenthal (1852–1912), and the late-awakened genius of Moser (1825–1903) The national patriotic drama was represented by Wildenbruch (1845–1909) The greatest of modern German dramatists, democratic and somewhat socialistic in tendency, naturalistic in technique, are Sudermann (1857–) and Hauptmann (1862–), but Halbe (1865–), Fulda (1862–), Schnitzler (1862–), and Hofmannsthal (1874–) are also well known Among lyric poets Liliencron (1844–1909), Dehmel (1863–), George (1872–), Busse (1872–), and Agnes Miegel (1879–) have become prominent Among novelists are to be noted Isolde Kurz (1853–), Helene Böhlau (1859–), Clara Viebig (1860–), Von Polenz (1861–1903), Frenssen (1863–), Ricarda Huch (1867–), Zahn (1867–), Bartsch (1873–), and Mann (1875–)

Bibliography Of histories of German literature in German, the most readable is Scherer

(10th ed, Berlin, 1905, Eng trans, London, 1906) Consult also Bartels, *Geschichte der deutschen Litteratur* (Leipzig, 1902), Koberstein, *Grundriss zur Geschichte der deutschen Nationallitteratur* (5th ed, by Von Bartsch, Leipzig, 1872–74), more compendious Wackernagel (2d ed, Basel, 1879–94) is valuable for its copious references, and Kurz (Leipzig, 1876) for its illustrative extracts German poetry is fully treated by Gervinus, *Geschichte der deutschen Dichtung* (5th ed, Leipzig, 1874), Goedeke, *Grundriss der Geschichte der deutschen Dichtung* (Dresden, 1884–1900) For special periods, see Uhland, *Geschichte der altdeutschen Poesie* (Stuttgart, 1865), Hettner, *Litteraturgeschichte des 18 Jahrhunderts* (4th ed, Brunswick, 1879–95), Julian Schmidt, *Geschichte der deutschen Litteratur von Leibnitz bis auf unsere Zeit* (Berlin, 1886–96), Haym, *Die romantische Schule* (ib, 1870), Gottschall, *Deutsche Nationallitteratur des 19 Jahrhunderts* (7th ed, Breslau, 1901), Stern, *Die deutsche Nationallitteratur vom Tode Goethes bis zur Gegenwart* (4th ed, Marburg, 1900), Prolss, *Das junge Deutschland* (Stuttgart, 1892), id, *Geschichte des neuern Dramas* (Leipzig, 1880–83), Meyer, *Die deutsche Litteratur des 19 Jahrhunderts* (Vienna, 1901), Vogt and Koch, *Geschichte der deutscher Litteratur* (2 vols, 2d ed, Leipzig, 1904), Holzke, *Zwanzig Jahre deutscher Litteratur* (Brunswick, 1905), A. Biese, *Deutsche Litteraturgeschichte* (3 vols., Munich, 1912) Among later English histories the translation of Scherer is still the best, but Francke, *History of German Literature as Determined by Social Forces* (4th ed, New York, 1901), shows critical originality Briefer histories are Bostwick and Harrison, *Outlines* (London, 1883), Sellss, *Critical Outlines* (trans, ib, 1884), Wells, *Modern German Literature* (ib, 1895), Bossert, *Histoire de la littérature allemande* (Paris, 1901), Thomas, *History of German Literature* (New York, 1909), Robertson, *A History of German Literature* (London, 1902); id, *Outlines of the History of German Literature* (New York, 1912); Stroebe and Whitney, *Geschichte der deutschen Litteratur* (ib, 1913) Heller, *Studies in Modern German Literature* (ib, 1905), Taylor, *Studies in German Literature* (ib, 1879); MacCallum, *Studies in High German and Low German Literature* (London, 1884), and Lessing, *Masters in Modern German Literature* (New York, 1912), are occasionally useful Brandes, *Main Currents in 19th Century* (new ed, 6 vols, New York, 1906), is a careful and accurate study

GERMAN MEASLES; ROTHELN, RUBELLA. Sometimes also called French measles and false measles The disease is an acute infectious exanthem, characterized by mild fever, enlargement of the lymph glands of the neck, a rose-colored rash of variable distribution, sometimes resembling the eruption of measles, in other cases simulating that of scarlatina The infection is a mild one and not dangerous to life ordinarily, although occasionally malignant cases have been recorded Since its discovery by Hoffman, in 1740, De Bergen in 1752, and Orlow in 1758, many authors have disputed its existence as a clinical entity, classing it as a modified form of measles (q v) It is now, however, accepted as a distinct disease Rubella occurs in epidemics, principally among children It may be transmitted by direct contact or by fomites, but the contagious principle has not been isolated The incubation period is from 14 to 20 days Treatment is limited, as a rule, to keeping the patient in bed, on a light diet, and administering a mild febrifuge, such as spirits of nitrous ether, and laxatives

GERMAN METHODISTS See EVANGELICAL ASSOCIATION

GERMAN MILTON, THE A title occasionally given Klopstock (q v), author of the *Messias*

GERMANO, jâr-ma'nō, SAN A city in south Italy, the name of which was changed in 1871 to Cassino (q v) (Map Italy, F 5)

GERMAN OCEAN See NORTH SEA

GERMAN PLATO, THE A name given to Friedrich Heinrich Jacobi

GERMAN POLITICAL PARTIES. See POLITICAL PARTIES, *Germany*

GERMAN REFORMED CHURCH See REFORMED CHURCH IN THE UNITED STATES, GERMAN

GERMAN SEVENTH-DAY BAPTISTS. See paragraph on *Baptists, German Seventh-Day,* under BAPTISTS

GERMAN SILVER. A popular term describing the alloys of copper, zinc, and nickel It is not a compound, but consists of mixed crystals, the freezing-point curve falling regularly from that of nickel to that of copper It was originally made at Hildburghausen, Germany, and had the composition of copper 40 4 parts, nickel 31 6 parts, zinc 25 4 parts, and iron 2 6 parts As this alloy came into more extensive use, different proportions of the ingredients were used As an alloy intended to replace silver, it is made of copper 50 parts, nickel 25 parts, and zinc 25 parts When an exceedingly malleable alloy is desired, the proportion of nickel is reduced to 20 parts, and that of zinc increased to 30 parts A tough and malleable alloy is made of copper 60 parts, nickel 20 parts, and zinc 20 parts German silver is harder than silver and takes a high polish It is used as a substitute for silver in making castings—e g, for bells, candlesticks, and especially as a foundation for plated ware It must, however, be remembered that German silver is readily attacked by weak acids, like vinegar, and that its use at table, unless properly coated, may give rise to poisoning The smaller units of the coinage of various countries have been largely struck from a German-silver alloy, at times containing silver Certain parts of typewriters having hard and constant usage are made of a German-silver alloy containing a small percentage of aluminium *Packfong,* an alloy made by the Chinese, is of similar composition

GERMAN SOUTHWEST AFRICA. The oldest colony of Germany (Map Africa, F 7) Fronting on the west coast of Africa, it is bounded by Portuguese West Africa (Angola) on the north, by British South Africa on the east and south, and by the Atlantic Ocean on the west Estimated area, 322,000 square miles The coast line is about 950 miles long, and almost at its middle is the British port of Walfish Bay, which with the adjacent territory (area, 430 square miles) forms a part of Cape Colony (q v)

Topography Three natural regions are recognized—the coastal region, the highland, and the Kalahari Waste, the western part of which is in the German territory The winds (southeast trades), which are largely from the land, make this an almost rainless area The coast

is bordered by a belt of sand about 10 miles wide, behind which rises a barren steppe from 40 to 50 miles in width This valueless coastal zone is succeeded by the wide belt of highlands extending from north to south, rising at many points to an altitude of from 3000 to 6000 feet and culminating in Omatako Mountains (8800 feet) The eastern part of the highlands slopes gradually to the Kalahari Desert (q v), with which it merges. Three harbors are of commercial importance—Walfish Bay, which belongs to Great Britain, Angra Pequeña, and Swakopmund (the mouth of the Swakop River), which is the harbor most important for German interests, because it is through the valley of the Swakop that the highland—the valuable part of the country—may most easily be reached The only perennial rivers are the Cunene and Kubango, on the northern boundary, and the Orange, on the southern boundary The climate, except in the extreme north, is healthful The highlands are warmer than the coast, and although the uplands are very dry, there are many thunderstorms in the warmer part of the year, when the stream beds fill and the parched valleys for a short time are green with verdure

Agriculture Many European field crops and vegetables may be grown along the streams and near the wells where the farmers procure water for their tilled lands While the white population (on Jan 1, 1913, 14,830, of whom 12,292 were German) is still small, it is larger than in all the other German colonies together and includes over 1000 Boers Cattle raising is the chief industry of the white immigrants and the natives In 1913 the live stock included 205,643 cattle, 543,347 sheep, 516,904 goats, 15,916 horses, 13,618 mules and asses, 11,194 karakul, 7772 swine, and 709 camels

Gold is known to occur, and copper mining is carried on, in 1912, 27,500 tons of copper ore were exported Diamonds are found in the neighborhood of Luderitzbucht, production in 1912, 766,465 carats

The commerce of the colony is so far of small importance The exports, chiefly guano from the coast, cattle, skins, hides, copper ore, and ostrich feathers, increased from 32,396,000 marks in 1907 to 44,344,000 in 1910 and then declined to 32,499,000 in 1912 The imports, principally foodstuffs, iron and iron products, textiles, beer, tobacco, etc, increased from 1,616,000 marks in 1907 to 34,692,000 in 1910 and 39,035,000 in 1912 All but a small part of the trade, which passes chiefly through the port of Swakopmund, is with Germany The transportation facilities are limited In the interior the bull cart is the chief means of transportation A main road runs from north to south and is connected with the coast Though the means of communication are inadequate, German Southwest Africa has nearly as much railway as German East Africa, Kamerun, and Togo together At the end of 1913 there were in operation 2104 kilometers (1307 miles), divided among four lines the Otavi Railway, 671 kilometers (417 miles), Swakopmund-Windhuk Railway, 382 kilometers (237 miles), Northern Railway, 506 kilometers (314 miles), Southern Railway, 545 kilometers (339 miles) There are internal telegraph lines, and communication with Europe is effected by means of the Cape and Mossamedes cable, which touches at Swakopmund A regular steamship line connects Swakopmund and Hamburg Windhuk, the seat of government, and Otavi are among the most promising settlements

The administration is in the hands of a governor, assisted by district officers In 1913 a legislative assembly, half elective and half appointive, was established Prior to the late native uprising there was a colonial army of 800 men, exclusively Germans, in the early part of 1906, about 14,500 men were engaged in suppressing the rebellion, but a large number were later withdrawn, in 1913 the police and military force consisted of about 3000 men For the year 1913–14 the budget balanced at 32,791,672 marks, of which colonial receipts amounted to 18,164,832, and Imperial subvention 14,626,840, in addition, loans for extraordinary expenditure amounted to 21,350,000 marks The native population in 1913 was estimated at only 81,000, other non-European population, 3000, whites, 14,830, of whom 12,292 were German The natives are sharply divided from one another by the topographic aspects of the interior Bantu tribes (Ovampo, Herero, and others, the Herero being greatest in number and power) inhabit the mountain regions of the north, Damara the central part, and Hottentots the southern plateaus (Nama Land) A sparse population of Bechuana and Bushmen dwell on the plains of the Kalahari Desert

History. In 1883 the German merchant Luderitz, of Bremen, established a trading station at Angra Pequeña (now Luderitzbucht) and secured by purchase the surrounding territory, which he named Luderitzland, and which he ceded to the German government in 1884 By treaties with the native chiefs the German government obtained territorial and mining concessions in the interior, and by treaties with Portugal and Great Britain in 1886 and 1890 respectively, the northern, eastern, and southern boundaries of the colony were fixed By 1898 German supremacy had been practically established over the entire territory In the fall of 1903 the Bondelzwarts, a Hottentot tribe in the southern part of the colony, rose in rebellion They were pacified in January, 1904, but the removal of German troops from the north was followed by a formidable uprising of the powerful Herero nation German colonists were massacred, and the existence of the colony was seriously threatened Reenforcements were hastily brought from Europe, and in August, 1904, a concerted attack was delivered on the Herero forces concentrated in the Waterberg region The natives were dispersed, and the struggle entered the guerilla stage In October, however, the Hottentot tribes of the south, joined by Herero fugitives, declared war against the government, and for a year, under their chiefs Morenga, Witboi, Hendricks, and Morris, more than held their own against the Germans, who were hampered by the extremely difficult nature of the country and the lack of water and transportation facilities The war lasted through 1905 and into 1906. Up to March of that year the cost of the war to Germany was more than $50,000 000 and nearly 2000 men dead and wounded, while 14,500 troops were still engaged in the colony The sanguinary nature of the contest appears from the report that of the Herero nation, estimated at 100,000 before the war, only 11,000 surrendered Of the rest some fled to British territory, but the greater part had succumbed in the war or perished in the Kalahari Desert In 1907 the war broke out again, when

Morenga escaped from British territory, where he was looked upon as a political refugee. He was hunted down and finally killed This was probably the greatest step towards the complete subjugation of the colony In 1908 diamonds were discovered, and immediately a large crowd of adventurers rushed in In 1909 over $5,000,000 worth of diamonds were shipped to Germany In 1911–12 France and Germany nearly went to war over the latter's African possessions, and war was only averted by the former's concessions Germany must now take an equal rank with both France and England as an African power For an account of the military operations consequent upon the outbreak of the European war of 1914 see WAR IN EUROPE

Consult Von Bulow, *Deutsch-Sudwestafrika* (Berlin, 1896), Watermeyer, *Deutsch-Sudwestafrika* (ib., 1899), Hermann, *Viehzucht und Bodenkultur in Sudwestafrika* (ib, 1900), Schwabe, *Im deutschen Diamantenlande* (ib, 1909), Dove, *Sudwestafrica* (ib, 1913)

GERMAN THEOLOGY. As the theology of the original home and chief seat of Protestantism, and as a doctrinal system which has experienced great vicissitudes, German theology has a peculiar interest and value to the historical student

I **The Foundation.** The fundamental element of the Reformation was the spiritual change of regeneration, out of which sprang the conception of justification This was "by faith" because it had come in the midst of an experience of real and living contact with God The Nicene foundation was retained because it accorded with the experience of the saving work of Jesus Christ The Augustinian anthropology was retained because it explained the sense of helplessness in sin. The preaching of Luther may be summed up as a preaching of Christ as a living Redeemer by one who claimed a personal experience of what he preached Melanchthon began the process of teaching and formulating the new theology at an early date (1520) By the year 1530 a mature and well-balanced sketch of the reformed doctrine was prepared for presentation to the Diet of Augsburg This "Confession" explicitly rejects those features of the Catholic system which Protestantism (q.v) united in regarding as errors and briefly gives assent to the common doctrines of all Christian churches It is distinguished by the following doctrines. justification by faith, obedience to God's law, not required as a condition of "meriting justification," but springing out of faith; the Church, "the congregation of saints and true believers", two sacraments, prevenient grace, the guilt and personal origination of sin. The personal attitude of Luther towards the Scriptures was quite free The canonicity of any book was determined by its relation to Christ The authority of the Scriptures he rested upon the testimony of the Spirit. His views of the bondage of the will were extreme, and his doctrine of predestination absolute By the time when the Formula of Concord was written (1576), predestination was identified with election to life alone Thus the tendency of this theology was from life to doctrine.

II. **The Period of Formal Orthodoxy.** When the main doctrine of the new system had been determined, the attention of theologians was naturally directed from the search after new truths to the formulation, adjustment, and defense of the truths already gained This was the more necessary because of the foundation of the Order of Jesuits especially established to counteract Protestantism, among the first members of which were accomplished theologians and disputants, such as Bellarmine Hence there arose a series of great constructive Lutheran theologians, of whom the principal were Calixtus, Calov, Johann Gerhard, Baier, Chemnitz, Hunnius, Hutten, Quenstedt The early portion of this period was also distinguished by the production of great hymns and by very effective evangelical preaching But as interest concentrated upon doctrine, the religious life began to wane The system also underwent serious modifications The doctrine of justification by faith lost its place as the controlling element in the system The change may be seen in the modification of the doctrine of the Scriptures The freedom of Luther disappears, the testimony of the Spirit is undervalued, theories of divine dictation arise, and finally the authority of the Church is sometimes declared to be enough to maintain the canonicity of a book The immense havoc wrought by the Thirty Years' War completed the demoralization of both religion and theology

III. **The Period of Pietism** Some theologians had protested against the scholastic tendency of theology, but without effect It was arrested by a remarkable revival of practical religion, which spread over Germany This commenced through the instrumentality of Johann Arndt, who published (Magdeburg, 1610), in 4 volumes, *True Christianity*—a book intended to arouse persons of all classes, but especially ministers and students, to practical and heartfelt religion as well as to purify the corrupt morals of the age. It produced a powerful impression The movement thus commenced was greatly advanced by Spener (1635–1705) He established religious meetings, called "colleges of piety" This name led to the movement being called pietism It spread rapidly through Germany and at first without excitement or opposition But as the effect increased, popular agitation was awakened, and violent tumults arose which, beginning in Leipzig, extended through the Lutheran churches in the different states of Europe From this time, in all cities, towns, and villages where Lutheranism was established, there appeared suddenly persons, of various ranks and of both sexes, who declared that it was their mission to uproot iniquity, spread true religion through the world, and impart to the Church of Christ wiser rules than those which then prevailed, but without introducing any change in the doctrine, discipline, or government of the Lutheran church The University of Halle, founded 1694, became the home and centre of pietism The orphan house, established in that city by Francke, was one of its most efficient instrumentalities, because a living proof that it was able, not only to resist religious error, but also to supply the gravest wants of life. During the 30 years after the university was founded, it educated 6000 theologians Its Oriental college prosecuted diligently the study of the biblical languages and sent out missions to Mohammedans and Jews From Halle the new life was diffused over Europe The larger cities showed signs of reviving faith, and even the universities, which at first had violently opposed the movement, became its friends Pietism was extended into Wurttemberg and the University of Tubingen by the labors of **Bengel,**

the critic, exegete, and theologian of the movement, and into Moravia by those of Zinzendorf, Zurich, Basel, Bern, and many other large towns admitted it It went as far east as the Baltic and as far north as Norway and Sweden Many of the continental courts were influenced by it The Reformed church was awakened, England and the Netherlands received the new movement with joy

The movement did not fail to stir up prolonged controversy between the pietists and the theologians Among the results of this are to be numbered the historical labors to which the mediating school turned its attention, in which Mosheim bore a leading part Modifications of orthodoxy were also made in the direction of curtailment, the guilt of original sin was made to depend upon consent to Adam's sin, inspiration was weakened, justification was confounded with sanctification, the Trinity, incarnation, and atonement were regarded as mysteries which it was useless to attempt to comprehend The experimential proof of Christianity was more and more abandoned, and an external, philosophic proof substituted in its place The school of Wolf sought to demonstrate Christianity mathematically The idea of God was derived from the light of nature, the holiness of God in the presence of guilt proved the necessity of the revelation of an atonement, if atonement is possible and capable of being known Now it is possible, and its predicates constitute the criteria of a revelation, to which criteria the Scriptures correspond The proof of the Scriptures was later still more externalized The argument began from the authenticity, genuineness, and historical credibility, then were inferred the sinlessness and miracles of Christ, which are to be credited, then His promise to the disciples of inspiration, and then the authority of the inspired Scriptures This is an essential change from the method of the Reformation

IV **The Inroad of Rationalism.** 1 *Its Incipient Advance*—In the next generation the fervor of pietism had abated The diligent study of scriptural truth was exchanged for passive assent to it Spener had endeavored to unite reason and faith, but his followers, renouncing reason, clung to faith alone. In this way pietism unintentionally, but really, exerted an influence against the orthodox system of doctrines by attaching great importance to the Bible alone as opposed to creeds, and to the witness of the Spirit as opposed to the written word Zeidler, an eminent minister at Leipzig, honoring the Bible, treated systems of doctrine with contempt Some fervent mystics, in their zeal for the "inner word," spoke lightly of inspiration and atonement Some insisted simply on Christian love and morality, heedless of danger from the assaults of false teachers Koch (1754) lamented the low esteem into which the Bible had fallen among all classes of society This pressure against orthodox doctrine at home was strengthened by influences coming from England and Holland, the force of which may be estimated by the opposition at first made to it as indicated by the fact that, within 40 years, nearly 90 works were published against various phases of unbelief 2 *The Period of Historical Criticism*—At the middle of the eighteenth century German theology was in a rigid and shallow condition The contest between pietism and formal orthodoxy had ceased

The second generation of professors at Halle had gone. The old defenders of orthodoxy had disappeared Then the era of historical criticism was ushered in New investigations were begun, antiquity, literature, science, were diligently explored, the circle of religious beliefs was thrown open for reexamination On this field also English deists had already been at work In Germany, Semler of Halle led the advance, obscuring the old orthodox landmarks, questioning the accuracy of the biblical text, disputing the genuineness of many biblical books, and undermining usages and doctrines which hitherto all had received The vigor of critical examination thus awakened spread rapidly among the universities and the clergy It was employed on biblical criticism and exegesis, Church history, and the history of doctrine To the authority of the Church Semler, indeed, held fast, affirming that the symbols and forms are useful in preserving external unity and uniformity He asserted that Christ and the Apostles taught many things in mere accommodation to the prejudices of the age The doctrines of the Bible Semler vigorously attacked What he did at Halle, other men did in different parts of Germany It became manifest that criticism, if left to itself, would produce only destruction This compelled the search for something that would avert the fall At the opening of the nineteenth century the Scriptures, rationally interpreted, were still regarded as teaching a rational religion But as the historical exegesis had advanced, the chasm had widened between the traditional and the rational sense The accommodation theory was increasingly applied to every portion of the Bible, and at length the mythical theory began to appear Baur, in 1824, published a Hebrew mythology of the Old and New Testaments, in which the miracles were explained away as merely natural events 3 *The Connection of Rationalism with Philosophy*—The work of preparation for rationalism had at first been prompted by the demands of what was called "the sound human understanding", but after the opening of the eighteenth century the aid of philosophy also was sought Wolff proposed a division of theology into natural and revealed, and as natural theology could give the reason for the facts which it affirmed, and revealed could not, emphasis was put chiefly on the former After the decline of Wolff's popularity the criticism of Semler and his followers seemed harmonious enough with the eclectic system which for a time prevailed, for both the criticism and the philosophy were in accordance with the demands of "the sound human understanding" But Kant's philosophy assailed both Some of the rationalists, indeed, claimed it as favorable to them, others slighted it as unintelligible, but a few more discerning men saw that the new would overturn the old When the speculative systems of Fichte and Schelling appeared, they despised the reasonings of "the sound human understanding" and slighted the best principles of rationalism as commonplace and vulgar And rationalism, on its part, shrinking back from the new atheism, wrote strongly against it In the faith philosophy of Jacobi the rationalists thought they could find refuge Their scheme hitherto had allowed no scope to sentiment and the heart A mere probability was its highest word for the essential truths The system of Jacobi met this dif-

ficulty, since to the intellectual probability it added the certainty of feeling Therefore the better class of rationalists welcomed it With this rose also the supernaturalist school, including those who denied the absolute rule of reason in matters of religion, and, though many of them were deficient in reverence for the Bible, they were at least travelers in an upward path Hegel and his followers professed to present the pure and final rendering of that which Christianity gives in a popular form—to vindicate philosophically the Trinity, the atonement, and the other doctrines of the orthodox creed, and to refute the rationalism which had impugned these mysteries This claim Strauss, in his life of Jesus, utterly denied Treating the Gospels as a narrative of merely natural events, he asserted that Jesus was a devout man, whose rebukes of hypocrisy led to his death The wonderful works of beneficence and power with which the narrative was adorned were only fanciful inventions of His disciples, which ultimately came to be regarded as facts This historical Jesus Strauss strove to transform into an ideal character, and affirmed that the God man is to be looked for not in any one person, but in the human race as a whole

V **Return to Evangelical Doctrine** As the way for the prevalence of rationalism had been opened through the decline of practical religion, so the return to evangelical doctrine was effected by a revival of personal piety While Semler was subjecting the Bible to rationalistic criticism Klopstock wrote and published his *Messiah*, which was spread over every part of Germany and among all classes, awakening admiration and kindling devotion About the same time Hamann, a young German, after vainly seeking relief in folly and vice from the effects of disappointment, retired to a remote part of London, obtained a Bible, and read it carefully With a revulsion of feeling he entered at once on a new course His writings and genius soon procured him friends in his own country and gave him influence over the noble, the gifted, and the rich, by which they, as well as men of humbler life, were won to the Christian faith Herder, contemporary with both Klopstock and Hamann, in his *Spirit of Hebrew Poetry*, gave attention particularly to the literary and human elements of the Bible as, in his opinion, strengthening its claims to a divine origin. He pointed out critically its poetical beauties, not as if they were ornaments only, but as springing from the heart of the revelation and forming an essential accompaniment of inspiration While imparting elevated views of the Scriptures, he labored also to exalt the pastor, considering that his true place was by the side of the old prophets, and that no man was worthy of the office who neglected the particular care of souls He was himself, in many respects, a model preacher. While the three distinguished men above mentioned were in the midst of their active work, Schleiermacher was born, who has been called the greatest divine of the nineteenth century, and to whose influence for good scarcely any limit can be assigned In his fifteenth year he was sent to a Moravian school, whence he brought a personal devotion to Christ His *Discourses to Unbelievers of Cultivated Minds* (1799) marked at once the opening of a new century and of a new era in religion In 1789 David Mendel was born of poor Jewish parents—his father a peddler, his mother an intelligent and pious woman At Hamburg he was assisted in acquiring an education and soon won the respect of teachers and scholars by his talents, while he excited also their merriment by the oddity of his appearance and the awkwardness of his manner When Schleiermacher s *Discourses* were published, Mendel was one of the multitudes awakened by them, and in 1806, renouncing Judaism, he was baptized and took the name Neander (a new man) He studied theology at Halle, where Schleiermacher was his favorite professor and deeply interested friend In 1812 both teacher and pupil were made professors in the new university at Berlin—the former of theology, the latter of Church history. In this position Neander worked to the end of his life and acquired, as a lecturer, vast renown Even Schleiermacher's hearers were limited in number when compared with the crowds that came from all parts of Germany and the most distant Protestant countries to hear Neander Many Roman Catholics also were found in his classes All the great preachers of Germany became more or less enlightened by his ideas His salutary influence on the religious condition of the country was immeasurably great, powerfully contributing to the overthrow both of rationalism and of dead formalism and drawing multitudes of young men to embrace the vital doctrines of Christianity With him religion was nothing without Christ—not only apprehended by the intellect, but also loved and trusted with all the powers of the soul In his view sin was not only injurious, but also involved guilt, and could be pardoned only through the death and mediation of Christ In 1816 Tholuck entered the University of Berlin, where he was rescued from skepticism under the instructions of Schleiermacher and Neander, aided by the influence of a distinguished Moravian friend In 1826 he became professor of theology at Halle as the successor of Professor Knapp, who had sincerely but timidly resisted the prevalent rationalism Out of 900 students only five avowed their belief in the divinity of Christ, and all the professors, being rationalists, opposed Tholuck's appointment But the number of young believers in Christ increased year by year Many thousands of young men became Christians under his instructions Hengstenberg (1802–69) devoted his youth chiefly to the study of philosophy and the Oriental languages, but, during a season of sickness and sorrow, having turned with great ardor to the spiritual teaching of the Bible, he became fully convinced of the divine authority of evangelical religion and of the excellence with which its truths are expressed in the Augsburg Confession In 1826 he was made one of the professors of theology at Berlin, and from that time, for more than 40 years, was a conspicuous and earnest defender of Christian doctrine, as based on the divine authority of the Scriptures Among his numerous writings may be mentioned, as having special influence *Egypt and the Books of Moses*, *Commentary on the Psalms*, and *The Christology of the Old Testament*

VI **The Last Half of the Nineteenth Century** Four general schools of thought may be distinguished The first, proceeding from the school of Schleiermacher and adhering to the "union" (of the Reformed and Lutheran churches in Prussia), may be called an evangelical, conservative school, though in such

representatives as Dorner and Rothe exhibiting a large degree of speculative independence Dorner founded his system upon speculation rather than upon exegesis Julius Muller was the next important member of this school The second school, the confessional school, was still more conservative, rallying around the historic confessions of the Lutheran church It rose in the circles in which the Lutheran protest against the "union" was most vigorously made Its chief seat became the University of Erlangen, where a series of able men defended it—Harless, Thomasius, Hoffmann, Frank, and Zahn For a long time it was powerfully represented at Leipzig by Luthardt, Kahnis, Delitzsch, and their colleagues Thomasius, formed by Schleiermacher and influenced by Hegel, embraced the old Lutheran orthodoxy with great warmth and sincerity He sought to develop its Christology by the suggestion of the "kenosis" (q v) Hoffmann was the great exegete of the school Frank had more of the spirit of Luther than the others and based his theology upon Christian experience, conceived as having its ultimate element in the new birth Luthardt did not sympathize with these modifications Delitzsch, with others, formed the "New Lutheran" party, which laid great emphasis on the doctrine of the Church The third school takes its rise from Baur and has adhered in various degrees to the principles of Baur's historical criticism (Hilgenfeld) or has gone over to a substantial naturalism (Pfleiderer) It is most remarkable that, while the second school has still a large following among the pastors throughout Germany, in academic circles the three all lost their leadership and were almost everywhere replaced by the members of the fourth school, that of Ritschl (q v) From about 1870 to about 1900 the Ritschlian school was constantly upon the increase Ritschl, having for a time been an adherent of Baur, finally came to occupy a position of his own, which may be summarily described as an effort to derive theology from the principle of the divine love, with such an emphasis upon the Christian life that elements of the doctrinal system not having evident connection with this should be excluded Purely speculative theology was regarded as belonging to philosophy, not to religion The essence of religion is a practical faith, issuing in ethical and social life Ritschl was succeeded at Gottingen by Schultz, his colleague, and the school is represented at many places—at Bonn, Bender and his son Otto Ritschl, at Strassburg, H H Wendt, at Marburg, W Herrmann, at Basel, Duhm At Leipzig, Gregory, who has continued Tischendorf's work, is a Ritschlian But the centre of the influence of the school is now Berlin, where Kaftan represents the right wing, approaching very close to evangelical standards in his *Dogmatik*, and repairing most of the defects and omissions of Ritschl; and Harnack the left wing, whose monumental historical work has given him the acknowledged first place in his department in the world As defined by one of their own number, "the Ritschlian school is not a school, and embraces men of quite widely different styles of thinking, being united only in this, that it demands that a man shall love truth and seek that alone without fettering prejudices All such it welcomes"

During the last decade a new school, the *Religionsgeschichtliche*, history of religion, has arisen in Germany, largely from the Ritschlian school It does not abandon the essential Ritschlian positions, but designs to supplement them The school aims to remove Christianity from the isolation in which previous theological study has kept it and to interpret it in the light of the religions which influenced its origin It wishes to make religion a power in life and to this end has popularized the results of scholarship in series of small books, *Popular Tracts of the History of Religion* and *The Problems of Life*, and in popular journals It agrees with the Ritschlian school in basing religion on experience rather than upon theology or Church authority While most of the work of the school has been historical, Troeltsh is its representative in systematic theology Its task will be to work out what Ritschlianism did not have, a philosophy of religion Meantime the extreme rationalism of earlier years is represented by the Monist League, which attempts to popularize the ideas of Haeckel, and the extreme conservatism by a revived conservative movement which does not ignore the results of modern scientific study, but still holds to an objective revelation issuing in dogma

Consult Dorner, *History of Protestant Theology* (trans, Edinburgh, 1871), which covers the whole field, Landerer, *Neueste Dogmengeschichte* (Altenburg, 1881), beginning with Semler, Frank, *Geschichte und Kritik der neueren Theologie* (Leipzig, 1898), beginning with Schleiermacher, Lichtenberger, "History of German Theology," in the *Nineteenth Century* (New York, 1889) Nippold and Pfleiderer have published valuable sketches of the theological history of the nineteenth century

GERMAN TINDER See AMADOU

GERMANTOWN A former suburb of Philadelphia, since 1854 included within the municipal limits and now forming the twenty-second ward (Map Philadelphia and vicinity, D 3) It is about 5 miles to the north of the centre of the city Its picturesque site, the superior character of its architecture, its beautiful gardens, and the large public libraries render it a charming place of residence To the west is the romantic gorge of the Wissahickon, to the north is Chestnut Hill, with its fine villas There is a large section occupied by manufacturing establishments Germantown was settled in October, 1683, by a party of Germans, four of whom in 1688 made the first formal protest ever made in America against slaveholding The first paper mill in America was erected here in 1690, and here also, in 1743, the first American edition of the Bible in any language was printed Germantown is chiefly notable in history for the battle which was fought here on Oct 4, 1777, between the Americans under Washington and the British and Hessians under Howe Washington opened the engagement at daybreak on the 4th At first his centre and left, under Sullivan and Greene respectively, forced back the opposing British and Hessians, and victory for a time seemed assured, but Stephen, on Greene's right, through a dense fog, mistook the American left centre under Wayne for the enemy and opened fire, while a body of English, who had taken refuge in a large stone house, the residence of Judge Chew, in the rear, detained a part of the American forces Stephen's accident, coupled with the continual firing in the rear, threw the American troops into confusion, but Washington led them from the field in perfect order The British

loss was 575, the American, 673 Washington's apparent audacity in attacking Howe so soon after the battle of Brandywine (q v) greatly encouraged the army and the people and, together with Gates's success at Saratoga, led the hitherto wavering French court to form an alliance with the United States Consult Scharf and Westcott, *History of Philadelphia* (Philadelphia, 1884), Carrington, *Battles of the American Revolution* (New York, 1878), Lossing, *Field Book of the Revolution* (ib, 1859), Pennypacker, *Settlement of Germantown* (Philadelphia, 1899), Jellett, *Germantown Old and New* (Germantown, 1905), Jenkins, *Washington in Germantown* (ib, 1905), Keyser, *History of Old Germantown* (ib, 1907), Sachse, *Quaint Old Germantown* (Philadelphia, 1913) For a further description of Germantown, see PHILADELPHIA

GERMA'NUS, or GERMAIN, SAINT (c 378–448) Bishop of Auxerre He was born in Auxerre, 100 miles south of Paris, of an eminent family, and became learned in literature and law and distinguished for eloquence He was military governor of his native district, afterward Bishop of Auxerre. On being chosen Bishop (418) he separated from his wife, built a monastery, devoted his spare property to the poor, and thereafter lived a life of the severest asceticism He visited England twice (430 and 447) for the purpose of combating Pelagianism, and on the first occasion, shortly after Easter, 430, led the Britons against a plundering party of Picts and Scots, terrifying them into a retreat by shouting "Alleluia," from which circumstance the event was called the "Alleluia victory." It was he who discovered the future patron saint of Paris, Genevieve (q v.) His life as told is romantic and in part miraculous He died at Ravenna, Italy, July 31, 448 His feast occurs on July 31 The Life attributed to Constantius, but which may be by a later writer, was put in verse by Heiricus, or Hercus, of Auxerre, and used by Bede (q v) in vol i of his History. Consult Baring-Gould, *Lives of the Saints*, vol ii (London, 1874); Stephen Langdon, "Life of St Germain," in No 9 of the *Lives of the English Saints* (ib, 1844), also, for his connection with St. Patrick, Barry, *Life of St Patrick* (ib, 1905)

GERMAN VERSION. See BIBLE

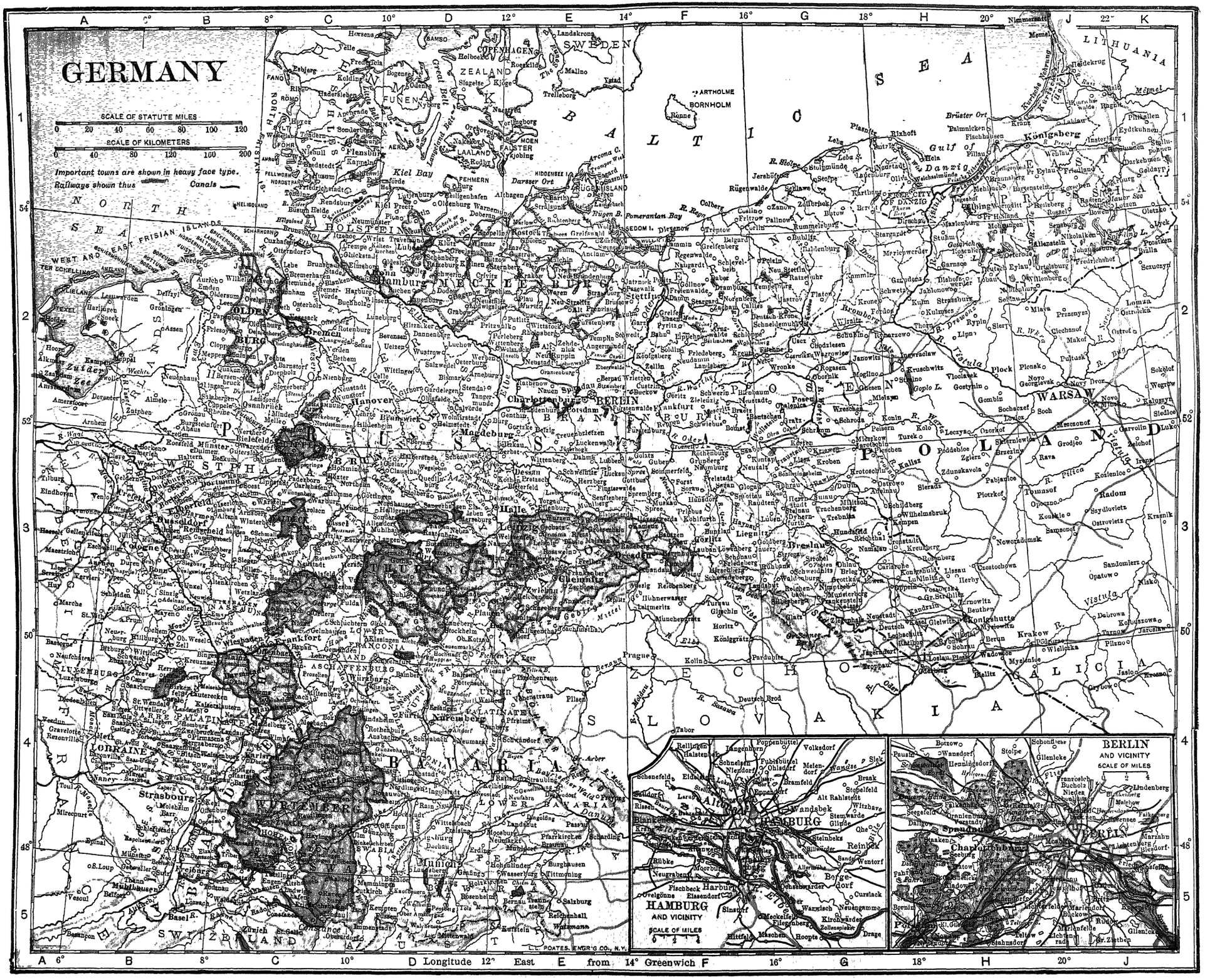
GER'MANY. An empire which takes in the central part of Europe The main highways between the north and south and the east and west of Europe pass through it It is in closer touch with most of the leading nations of Europe than any other country, for it is bordered by Russia, Austria-Hungary, Switzerland, France, Belgium, the Netherlands, and Denmark, and is within a day's sail, across the North Sea, of Great Britain Besides the land boundaries formed by the seven countries above mentioned, it has a sea frontage of 1200 miles on the North and Baltic seas—one-third of the entire frontier The country extends east and west through 17° of longitude, or 750 miles, north and south through nearly 9° of latitude, 47° to 56° N, or about 600 miles. Its area is 208,825 square miles, exclusive of the German portion of Lake Constance (70 square miles) The German Empire embraces the territory of the German Confederation of 1815–66, with the exception of the Austrian portions thereof (in a great part of which the German language predominates), as well as of Luxemburg and Liechtenstein, but with the addition of the Prussian provinces of East Prussia, West Prussia, Posen (not included in the old German Empire), and Schleswig, and Alsace-Lorraine Capital, Berlin.

Topography. The southern two-thirds of Germany is highland, the northern third is lowland, a part of the low plain of Europe Three topographic forms predominate in central Europe The most southerly is the high Alps of Switzerland North of the high Alps are the Mittelgebirge (secondary mountains), or highlands of Germany North of the highlands is the German low plain The highlands consist in part of high plains, rolling or hilly areas, and in part of short mountain chains or groups of mountains, which extend from southwest to northeast or from southeast to northwest, seldom from south to north Only a few summits among these mountains exceed 3500 feet in height The mountain systems inclose high plains, as, e g, the plains of Bavaria and of the middle Rhine basin This division of south Germany by natural barriers was a powerful influence in separating the German people into many different states, each having its own government

The most northerly system of these mountain chains has a general east and west direction, roughly at right angles with the mountains directly to the south It extends through the middle of Germany and forms the boundary between north and south Germany, or, in other words, between the highlands and the low plain This zigzag boundary wall begins in the east with the Sudetic Mountains (including the Giant Mountains, or Riesengebirge) and is extended farther west by the Erzgebirge, the Fichtelgebirge, and the Thuringian Forest The valley of the Elbe is the only break in these 390 miles of boundary mountains Then comes the wide gap formed by the Hessian upland, broken only by the volcanic uplifts of the Rhon Mountains and the Vogelsberg Through this break in the barrier mountains flows the Weser to the north In the west the boundary wall rises again in the Taunus, around which is one of the finest wine regions of Germany and, across the Rhine valley, in the Hunsruck Outlying elevations to the north of this wall in the middle Weser and Rhine basins push the highlands a little farther north in that region, and the low plain in front of them is correspondingly contracted The culminating feature of these outliers is the Harz Mountains. The more southerly of the highlands mountains comprise among other chains or ridges the Schwarzwald, or Black Forest, the Swabian and Franconian Jura, and the Bavarian Forest. The Alps enter in the extreme south A dominant mountain mass west of the Rhine is constituted by the Vosges Physiographically interesting is the volcanic region, north of the Moselle, known as the Eifel The highest point of land in the Empire is the Zugspitze, in Bavaria, 9725 feet in elevation

In sharp contrast with the broken and divided character of the lands of south Germany is the nearly uniform low plain of the north, which merges on one side without any distinct natural boundary into the plain of Russia, and on the other into the lowlands of the Netherlands As the course of the chief rivers shows, the whole country slopes gradually north to the Baltic and northwest to the North Sea.

On the sea frontage there are many inlets,


GERMANY
SCALE OF STATUTE MILES
0 20 40 60 80 100 120
SCALE OF KILOMETERS
0 40 80 120 160 200
Important towns are shown in heavy face type.
Railways shown thus
Canals
NORTH SEA
BALTIC SEA
Gulf of Danzig
Kiel Bay
Pomeranian Bay
Zuider Zee
SWEDEN
DENMARK
COPENHAGEN
ZEALAND
FUNEN
LITHUANIA
EAST PRUSSIA
PRUSSIA
POLAND
WARSAW
BERLIN
BRANDENBURG
MECKLENBURG
HOLSTEIN
Hamburg
Bremen
OLDENBURG
Hanover
Magdeburg
Leipzig
Dresden
Breslau
Stettin
Königsberg
Danzig
WESTPHALIA
HESSE
NASSAU
SAXONY
BAVARIA
WURTEMBERG
Munich
Nuremberg
Frankfort
Cologne
Düsseldorf
Essen
Strasburg
LORRAINE
LUXEMBURG
SWITZERLAND
CZECHO SLOVAKIA
GALICIA
Prague
Vienna
Krakow
Lemberg
Longitude East from Greenwich
L.L. POATES, ENGR'G CO., N.Y.
HAMBURG
AND VICINITY
SCALE OF MILES
BERLIN
AND VICINITY
SCALE OF MILES

but few good harbors The shore waters are quite shallow, and large vessels are usually unable to approach the land except where the rivers have worn a channel Most of the harbors therefore are at the mouths of rivers or some distance inland on their banks Wherever the sand dunes along the low North Sea do not prevent the sea from breaking in, dikes have to be built for the protection of the coast The shores of the Baltic are higher, but the commercial facilities they afford are much impaired by a series of very shallow lagoons, called Haffs, which have been formed by sand spits and barrier beaches The islands are not important Rugen, in the Baltic, is the largest The Baltic shore is outbuilding and is bordered by an almost continuous line of sand dunes, but the North Sea line is receding, the Frisian Islands with their dunes representing the former coast line The most important North Sea ports are Hamburg, on the Elbe, and Bremen, on the Weser, together with the subsidiary ports of Bremerhaven and Geestemunde The principal Baltic ports are Stettin, Danzig, Kiel, and Lubeck

Hydrography. With the exception of the southeastern part of Germany, through which the Danube flows to the east, all the rivers belong to the Baltic and the North Sea basins The Rhine is the only river which binds together the three great topographic forms—the high Alps, the German highlands, and the low plain It belongs to three countries—Switzerland, Germany, and the Netherlands Commercially it is the most important river in Germany, small river steamers being able to ascend to Basel, and small seagoing steamers to Mannheim The Weser and the Elbe, the latter rising in Austria, bind together the German highlands and low plain The Elbe is second only to the Rhine in commercial importance, being navigable throughout the whole of its course in Germany. Along its course are some of the most important silver and coal mines, salt fields, sheep pastures, and beetroot areas in the Empire Besides being the greatest water commerce carrier through central Germany from the south border to the North Sea, it links Berlin, the capital and business centre, with Hamburg, the chief port, by the canals of the Havel and Spree river systems The Weser is also of great importance in its lower course. The Oder and the Vistula are the chief Baltic rivers Both rise in Austria, have only a short course in the highlands, and flow mainly through the lowland The Oder is the great waterway of the rich mining and manufacturing district of Silesia, and of the wide farming area around Frankfort-on-the-Oder, with the canal leading to the Spree it is a highway for Berlin's commerce from southeast Prussia to the port of Stettin The lower part of the Vistula is German, but it carries a great deal of Russian timber, grain, and fibres to Danzig for export Among other important streams are the Ems, flowing into the North Sea, the Main and the Moselle, affluents of the Rhine, the Pregel and Memel, flowing into the Baltic, and the Saale, an affluent of the Elbe. The rivers of Germany are naturally navigable for nearly 6000 miles, are canalized for nearly 1400 miles and there are nearly 1500 miles of canals Among the most important of the canals are the Ludwigskanal in Bavaria, uniting the Danube with the Main, and thus supplying a continuous waterway from the North to the Black Sea, the system connecting the Memel with the Pregel, that joining the Oder with the Elbe, the Plauen Canal, connecting the Elbe with the Havel, the Eider Canal, connecting the Eider with Kiel, the Rhine-Rhone, and the Rhine-Marne, in Alsace-Lorraine, the Dortmund-Ems Canal, connecting the Rhine with German ports and when completed with the other canals making a waterway system from east to west across the German lowland, the great Baltic Sea or Kaiser Wilhelm Canal, begun in 1887 and opened for traffic in 1895, saving two days' time by steamer between Hamburg and all the Baltic ports of Germany, and several canals in process of construction, notably the Rhine-Weser Canal, which is to cost over $60,000,000 See CANAL

The lakes of Germany are chiefly in two groups, of which the smaller is in the southern section, in the Alpine Foreland These lakes are found only in regions once covered by glacier ice, being rock basins, and their existence is closely connected with the scouring action of the ice sheet that descended from the Alps during the great Ice age The larger group extends over the northern lowland, with the greatest number of lakes east of the Elbe, and most of these were formed by the dumping of till across the valleys of streams during the retreat of the continental ice sheet

Climate The temperature differences between the north and the south are not so great as might be expected, because the elevation of the south, much higher than that of the north, counteracts the effect of the difference in latitude The differences are greater between the west and the east The Rhine lands are the warmest, and the Baltic Sea lands the coldest, parts of Germany The business of the Baltic ports is much impeded by ice in winter, while the North Sea ports are less affected by this impediment, though not quite free from it A line drawn from Bremen to Munich divides Germany into two sections climatologically On the west the climate is much like that of France, and mild winters and not excessively hot summers are the rule, but on the east the temperature assumes rapidly a more continental character, tempered by the close proximity to the sea at the north, but rigorous in the interior. The rainfall, owing to the nearness of the sea, is usually sufficient for all forms of agriculture. The Harz Mountains, far enough north to catch the wet winds from the North Sea, have the heaviest rainfall The annual rainfall is from 25 to 30 inches for most of north Germany, but in the extreme south and west it exceeds 30 inches In the neighborhood of some of the mountain ranges there are local increases of precipitation to 40 inches and upward.

Flora. In early days Germany was full of swamps and largely covered with forests Most of the swamps have now been turned into fields and pastures, but a fourth of the Empire is still covered with forests which are cared for as assiduously as any field crop A third of the forests are in leaf trees, the beech being most prominent Two-thirds are in coniferous trees, particularly pines and firs As the temperature decreases from west to east, the leaf trees predominate in the west excepting in the sandy low plain, and the coniferæ in the east. The crowning glory of the German flora is these woodlands

Germany has in the north the Baltic flora and

in the south the Alpine The two mingle in the interior The elevation of the land also has a strong influence on the local flora, so that the Alpine flora extends far to the north on the mountain tops, and the Baltic flora penetrates to the south in the valleys Moreover, on the east the steppe flora penetrates from Russia, and on the west the west European flora penetrates from France. Upward of 2200 flowering plants, 60 cryptogams, and 750 mosses are found in German territory In the south and west the vine grows luxuriantly, and grasses flourish in the lowlands

The best farming lands are in the warm, well-sheltered Rhine valley, with its rich alluvial soil, where the vine is brought to an unusual degree of perfection Many of the hill slopes throughout the highland are terraced and cultivated, but the mountains are forest-clad, and cultivation is chiefly confined to the plains and valleys The soils differ in natural fertility, but are better than those of the low plain of the north The soil of most of the low plain is poor and sandy, particularly in the centre and east, and is kept in a state of high productivity only by scientific tillage and fertilization

Fauna. Germany, because of its situation, exposed to cold airs of the north and cut off from the south by lofty mountains, has a decidedly northern fauna, and the fastnesses of the Harz and the mountains of Bavaria, Saxony, and Silesia have preserved several wild forms extinct or nearly so elsewhere in Europe Thus there may still be found there bears, wolves (occasionally, along the Russian border), foxes, martens, weasels, badgers, otters, wildcats, and lynxes Fallow deer are known only in a few parks, but the roe and wild boar are obtainable in many forests, and the elk still exists along the Polish border. All these, together with the Alpine chamois, are "preserved" The birds are those of Europe, with the absence of several semitropical species common south of the Alps Most of them are migratory and traverse the Empire along two great 'highways" One leads to and from Africa along the Rhine-Rhone valley and thence east in spring and west in winter along the Baltic shore to and from north Russia, the other follows the Danube valley to and from Asia Minor and India Of the resident birds the most remarkable is the great capercailzie of the eastern districts Reptiles are not as well represented in Germany as in warmer and more diversified France and Italy, and the adder is nowhere common One of its frogs, called the "fire-bellied," is well known Germany shares in the fish and fisheries of the North Sea and possesses the larger part of the south shore of the Baltic This inland sea seems some thousands of years ago to have admitted the ocean more freely, and then, as is shown by prehistoric shell heaps, marine fishes, oysters, and edible mollusks generally abounded in its waters Now there are few sea fisheries of consequence in any part of the Baltic, which seems to be growing steadily shallower and fresher, with consequent alteration of its biological character The rivers of Germany abound in fishes of large variety, among which the salmon and trout that ascend the larger streams from the Baltic are prominent The Danube forms a province of the Black Sea faunal district where no salmon are found The carp family is largely represented, and the catfishes (Siluridæ) of Germany are especially big, numerous, and edible Insects are numerous, and bees are raised in some provinces to an extent hardly equaled elsewhere in Europe

Geology The surface geological formations of the northern plain are mainly Quaternary sands and clays of alluvial glacial deposit, with an occasional patch of firm Tertiary formation emerging from it The great central highland is represented by all the formations, but is chiefly Mesozoic On the south border of the Quaternary plain where the highlands begin, there are in the region of the Weser highland narrow transition bands of the Cretaceous and Jurassic formations, which are replaced a little farther south by the great central area of Triassic rocks On the west of the Weser highland the Quaternary formation of the north is replaced on the south by a broader Cretaceous zone, somewhat interrupted by the Quaternary, and south of the Lippe in the region of the Ruhr is a narrow belt of Dyassic and coal formation which in the Sauerland highlands is replaced by the extensive Devonian and Silurian areas of the middle Rhine, and which extends far to the westward into France These formations are interrupted by patches of eruptive rocks and Tertiary formations and are bordered on the southeast directly on the Rhine by Tertiary formations, which, however, are soon replaced by the Quaternary, which characterizes the upper middle Rhine valley, and which interrupts the great Triassic area of central and south Germany West of the Rhine the Quaternary formations of the northern plain extend somewhat farther south than east of the Rhine, and are bordered on the south by the Jurassic of the Jura Mountains In the region of the Black Forest on the east end of the Vosges Mountains on the west of the Rhine valley are extensive areas of old crystalline rocks In the Harz Mountains the central area of Devonian and Silurian formations is surrounded by a narrow strip of Dyassic formation, which on the south is replaced by the Triassic, until interrupted in the Thuringian Forest by recurring Dyassic, Devonian, and Silurian formations. The great central Triassic area is bordered on the south by the long Jurassic chain consisting of the Swiss, Swabian, and Franconian Juras, which extend on the north side of the Rhone, the Aar, and the Danube from the Rhone to the Main Parallel to this chain and south of the Aar and the Danube is the extended Tertiary area of the Alpine Foreland and the Chalk Alps, which is separated from the central Alpine region of old crystalline rocks (Archean) by a narrow border of Jurassic formation Germany has been glacier-covered as far south as lat 51° 30′ in the western and 50° 30′ in the eastern part

Mining The mining interests are of great importance, the mines and smelting works combined having given employment to nearly 1,000,000 persons in 1912 Germany is the third largest coal and second largest iron producing country in the world, the United States leading in both, and Great Britain being second in coal production The export coal trade is steadily increasing The total yield of the mines, exclusive of lignite, for 1905, was 121,298,167 tons, and in 1911 160,747,580 tons The lignite production of 1911 was 73,760,867 tons The value of the coal product in 1911 was $393,000,000 and of lignite $45,000,000. Of this amount, nine-tenths were produced in the Prus-

sian provinces of Westphalia, Silesia, and the Rhine, and the remainder in Saxony, Bavaria, and Alsace-Lorraine About one-sixth was produced in government mines The steadily growing demand for fuel has greatly increased the mining of brown coal (lignite), in spite of its inferior quality, especially since the device of making it up into briquettes has enhanced its heating qualities and rendered it more convenient for storing and transportation than before Of the total output of 73,760,867 tons of brown coal in 1911 about four-fifths were produced in the Prussian provinces of Brandenburg, Saxony, and Hesse-Nassau The following table shows the growth of the coal industry since 1871

YEAR	Anthracite and bituminous	Lignite
	Metric tons	Metric tons
1871	29,400,000	8,500,000
1881	48,700,000	12,800,000
1891	73,715,700	20,536,600
1901	108,539,000	44,480,000
1905	121,298,000	52,498,507
1911	160,747,580	73,760,867
1913	191,511,000	87,116,000

The annual output of iron has been steadily growing, owing to the constantly increasing demand for raw material from the iron and steel works of Germany The output of iron ore in 1905 was 16,848,213 tons, and, in 1911, 23,800,000 tons, of which nearly three-fourths was produced in Alsace-Lorraine The output of pig iron in 1913 was 19,292,000 tons Germany is rich in other ores, such as copper, zinc, lead, bismuth, nickel, cobalt, etc, the bulk of which is produced in Prussia The quantity of gold is very small, but the silver mines are perhaps the richest in Europe, yielding about $8,000,000 worth of silver in 1911 More than one-half of the silver is produced in Prussia There are large deposits of rock and other salt and an abundance of potash salts, which have contributed greatly to the development of the chemical industry in Germany. Small quantities of petroleum, asphalt, manganese, and sulphur are found For a more detailed description, see articles on GEOLOGY and MINING

Fisheries. The German fisheries, while not of very great importance so far as the number of people engaged in them is concerned, have been materially improved in recent years, and the catch of the North Sea and Baltic amounts to about $4,000,000 per annum Among the fish of Germany the most generally distributed are carp, salmon, trout, and eels The rivers contain crayfish, pearl-bearing mussels, and pikes Cod and herring are taken in the North Sea, and the Baltic fisheries have some value The exports of fresh fish are insignificant About $20,000,000 worth of fresh fish, salted herrings, and other preserved and dried fish are imported annually. The fisheries employ about 35,000 persons, of which number approximately one-half are engaged in the inland waters and the remainder in sea and shore fishing

Agriculture Germany is no longer the essentially agricultural country that it was in the middle of the nineteenth century. At that time fully 65 per cent of the people were engaged in agriculture In 1882 that industry supported 42 per cent of the total population of the Empire, 35 per cent in 1895, and 31 per cent in 1907, as shown by the occupation census of that year The one-third of the population engaged in agriculture is no longer able to supply the home demand, Germany having become a heavy importer of food products and raw material Of the total area of 208,830 square miles, about 105,000,000 acres, or approximately 78 per cent, was classed as farm land in the occupation census of 1907 About 60 per cent of the farm land is under cultivation, the remainder devoted to meadows and sown pastures, fruits, and gardens About 25 per cent of the total area is forest lands, and but about 7 per cent waste lands, streets, etc

The land is cultivated with great care and intelligence, both in the rich and fertile river valleys of the south and west as well as on the less favored plains of the north and east, and produces every variety of grain and fruit common to a moderate climate Wheat, rye, barley, and oats are raised in all sections of the country, corn is raised exclusively in the south, while potatoes, as well as peas and beans, thrive best in the north Flax and hemp succeed best in the middle regions, and this is also true of the oleaginous seeds, rape, poppy, and caraway Hops, with the exception of those produced in the Prussian Province of Posen, are raised mainly in the south, in Bavaria, Wurttemberg, and Baden, and beetroot is grown in Prussian Saxony, Silesia, and Hanover, as well as in Brunswick and Anhalt (For further details, see the articles on those countries) The cultivation of cereals and potatoes is the most important branch of agriculture The former system of 'three-year rotation," in which the land is permitted to lie fallow every third year, has been largely abandoned, and alternation of crops accompanied by plentiful soil foods substituted This has resulted in an increase of food production in the Empire as a whole Among the cereals rye predominates, holding the place in Germany that wheat does in the United States In 1913, 16,035,347 acres were devoted to the culture of rye, as compared with 11,095,338 acres under oats, 8,530,037 acres under potatoes, 4,935,432 acres under wheat, and 4,134,527 acres under barley The progress of agriculture and the relative importance of the various products are shown in the following table

CROPS	Tons yield 1880	Tons yield 1905	Tons yield 1913
Rye	4,952,000	9,607,000	12,222,134
Wheat	2,059,000	3,700,000	4,655,156
Barley	2,076,000	2,922,000	3,073,254
Oats	3,700,000	6,547,000	9,713,698
Potatoes	19,400,000	45,042,000	54,121,146
Hay, etc	29,142,000	37,230,000	29,154,194

Thus, while a great part of the agricultural population was diverted to manufacturing and commercial pursuits, the output of cereals was increased during the last 32 years by from 50 to over 100 per cent Still, Germany is obliged to import increasing quantities of grain, especially wheat and corn, for its own use Germany produces large quantities of beets, hops, and tobacco, the production of sugar beets having made greater progress there than in any other country, the activity of the government in granting bonuses and otherwise encouraging the industry being accountable for this growth.

From 547,631 acres in 1882, the area under that crop increased to 737,742 acres in 1890, to 1,155,958 acres in 1905, and to 1,369,062 acres in 1913 The principal beet-growing district extends westward from Poland to the region about Brunswick In 1891 the area under hops was 107,835 acres, in 1900 it decreased to 91,890 acres, and to 67,922 in 1913 The area under tobacco diminished from 59,944 acres in 1880 to 35,452 in 1913 The tobacco crop declined from 52,197 tons in 1880 to 42,372 tons in 1890, to 31,877 tons in 1905, and to 10,671 in 1913 It is raised principally in the region of the Rhine, in the valley of the Neckar, and in the vicinity of Nuremberg The vine is grown along the Rhine and Moselle, in the valleys of the Main and the Saale, in Lower Silesia and Swabia In 1912 vines covered 272,265 acres, the value of the wine crop being about $25,000,000 per annum The Rhine wines have a world-wide fame Germany imports, however, double the quantity of wines that it exports

The great increase in the productivity of German agriculture is due to improvements in methods of cultivation and the increasing use of machinery

The distribution of agricultural land in Germany is shown by the following statement of the total number of agricultural inclosures (including cultivated lands, meadows, pastures, orchards and vineyards) cultivated by one household on June 12, 1907 number under 2½ acres 2 730,000, between 2½ and 25 acres, 2,300,000, between 25 and 250 acres, 675,000, above 250 acres, 23,000 (these figures being in round terms only), total number of farms, 5,736,082 total acres in farms, 105,000,000 One striking feature of this statement is the large number of very small farms, those under 25 acres forming 87 per cent of the number, while those below 2½ acres were 47 per cent of the total. At the other extreme the farms and estates with an area of more than 250 acres each constitute less than ½ of 1 per cent of the total The farms with an area of less than five acres each, though constituting much more than one-half of the total number, cover but little more than one-twentieth of the total area The large landowners possess about one-fourth of all the agricultural lands, leaving about three-fourths of the total area in the hands of the three classes whose farms range from 5 to 250 acres As a considerable number of the owners of the fourth class are peasants, it may be said that about one-half of the agricultural land of the Empire is in their hands, the land parcels of less than five acres being owned by workmen or people of small means, who use them as garden plots The large estates are the property of nobles and capitalists

About 85 per cent of the entire agricultural land is cultivated by the owners, and less than 15 per cent by tenants About 40 per cent of all the farmers cultivate their own land exclusively, a little over 30 per cent cultivate rented land, in addition to their own, the remaining 30 per cent cultivate rented land exclusively, the proportion of tenants has remained about the same since 1882.

Stock Breeding The rich meadows on the marshy plains of the north, the grassy mountain slopes and valleys of the central regions and the south, all afford excellent means for the rearing of domestic animals, making the stock-breeding industry important The scientific cultivation of all kinds of fodder grasses has also contributed greatly to the improvement and increase of German live stock Sheep raising has been on the decline for several decades, owing to low prices of wool caused by Australian and Argentine competition, but is still important in Saxony, Silesia, and Brandenburg The best breeds of horses are raised in Mecklenburg, Holstein, Hanover, and West Prussia, the Prussian studs have a high reputation throughout Europe Cattle are raised chiefly in the rich marshlands along the North Sea, and in the fertile valleys and mountain slopes of Bavaria, Wurttemberg, and Alsace-Lorraine The following table shows the growth of the stock-breeding industry

YEAR	Horses	Horned cattle	Sheep	Swine
1882	3,114,420	15,454,372	21,116,957	12,174,288
1895	3,367,298	17,053,642	12,592 870	13,562,642
1904	4,267,403	19,331,568	7,907,173	18,920,606
1912	4,516,297	20,158,738	5,787,148	21,885,073

Forestry The forest area of Germany is about 34,500,000 acres, the preservation and cultivation of which receive much attention and is scientifically conducted The local supply of timber, however, does not meet the demands of the home market, and importation is necessary The larger woods and forests in many of the states belong to the government and are under the care of special boards of management, which exercise the right of supervision and control over all forest land, whether public or private About one-third of all the forests belongs to the various state governments, about one-sixth is in the hands of the communes, the crown forests occupy 675,000 acres, and the remainder belong chiefly to private individuals The states of Hesse, Baden, Bavaria, Saxony, Wurttemberg, and Prussia are especially rich in forests. See section on *Flora*

Manufactures. The industrial progress of Germany has been so marked in recent years as to make that country second in all Europe only to Great Britain as a manufacturing state In 1910 nearly one-half the population was dependent upon manufactures and mining for a livelihood, as compared with 39 per cent in 1895 and 35 per cent in 1882 The growth in the manufacturing industries may be illustrated by the figures of production of certain leading articles of manufacture or those used in manufacturing (see *Mining*). Germany has in recent years taken second rank as a producer of pig iron, her product now exceeding that of England and being second to that of the United States In 1897 the pig-iron production of the three chief iron-producing countries was Germany, 6,900,000 tons, Great Britain, 8,900,000, United States, 9,700,000 In 1911 the product was Germany, 15,200,000, Great Britain, 9,500,000, United States, 23,600,000 The number of spindles in the cotton mills was, in 1887, 4,900,000 and, in 1905, 9,000,000 The export of cotton yarns, which amounted to $7,000,000 in 1900, was approximately $16,000,000 in 1912; that of cotton piece goods, in 1900, $60,000,000, in 1912, $105,000,000; woolen and worsted yarns exported, in 1900, $14,000,000, in 1912, $21,000,000, woolen and worsted manufactures, in 1898, $50,000,000, in 1912, $63,000,000 The quantity of cotton exported to Germany from the United

States, her chief source of supply, was, in 1892, 482,000,000 pounds, in 1902, 853,000,000, and, in 1913, 1,222,000,000 According to the number of persons engaged, the most important industry is clothing, the next in order of importance being the building trades and the manufacture of foods, with over 1,000,000 workers each, if we put the third (metal industry) and fourth (machine and instrument making) together, the combined metal industry ranks second only to the clothing industry, next to these, and at the same time the most important feeder of the German export trade, is the textile industry, which forms the oldest and most important of the German industrial arts The chief localities for the cultivation and preparation of flax and the weaving of linen fabrics are the mountain valleys of Silesia, Lusatia, Westphalia, the Harz, and Saxony (for thread laces), while cotton fabrics are made principally in Rhenish Prussia and Saxony The same districts, together with Pomerania and Bavaria, manufacture the choicest woolen fabrics, including damasks and carpets Since the formation of the Empire the textile industries have made remarkable progress, and the German manufactures now practically hold the home market and export to South America, Australia, the East, and even to England and the United States The growth of the cotton industry can be judged best from the increase of imports of raw cotton, which amounted to about 10,000 tons in 1840, 71,000 tons in 1871, 403,000 tons in 1905, and approximately 550,000 tons in 1912 Prior to 1871 the production of cotton goods in Germany was less than that of France, but the transfer of Alsace, a great cotton-manufacturing community, to Germany made its product of this industry greater than that of France The exports of cotton manufactures from Germany have grown from about $25,000,000 in 1886 to approximately $120,000,000 in 1912, the figures of the latter year including yarns as well as finished goods Laces and embroideries have also become an important feature of the cotton industry and trade, the exports of machine-made laces to the United States alone amounting to nearly $5,000,000 annually The silk industry and the manufacture of velvet thrive especially in Krefeld, Barmen, and Elberfeld, besides Berlin, Baden, and Aix-la-Chapelle Great progress has been made both in the quality and the quantity of the output, although in the higher grades France still remains unexcelled

Woolen goods are also largely manufactured in Alsace, the Rhine provinces, Silesia, and Saxony, the leading products being carpets, shawls, table covers, hosiery, and furniture covers, the export of woolens alone amounting to about $70,000,000 annually.

The iron and steel manufactures of Germany are among the most important in the world The chief seats of this industry are Westphalia and Alsace-Lorraine, the Pennsylvania of Germany, next in importance are the district of Aix-la-Chapelle, and isolated districts in Saxony, Wurttemberg, Bavaria, and Hanover. Iron and steel furnaces, steel mills for the manufacture of billets, rails, bars, plates, wire, and other kinds of structural and railroad material turn out their products in enormous and constantly increasing quantities, not only for the domestic markets, but also for distant countries, in competition with Great Britain and the United States The number of workmen thus employed increased from 164,000 in 1880 to 458,296 in 1904, or more than 179 per cent, producing 2,571,000 tons in the former year and over four times as much in the latter In certain branches of the iron industry Germany excels the rest of the world In the hardware industry the words "Made in Germany" branded on an article are universally accepted as a guaranty of excellence This applies chiefly to knives, scissors, needles, weapons, and instruments of all kinds German scientific instruments set the standard for precision and workmanship The famous Krupp works, employing over 70,000 workers in 1912, is the largest establishment in the world engaged in the manufacture of armor plates, heavy artillery pieces and projectiles, boilers, engines, and all kinds of half-finished products required in their manufacturing The shipyards of Danzig, Kiel, Stettin, Hamburg, Bremen, and other seaports furnish a supply of merchant and navy vessels which occupy the highest place among the navies of the world for speed, durability, and equipment The production of motor cars and boats in 1910 exceeded $25,000,000 in value

Germany is the largest beet-sugar-producing country, its share of the world's produce exceeding 30 per cent The principal seats of this industry are in Prussia, Brunswick, and Anhalt The number of sugar factories increased from 311 in 1871 to 342 in 1912, while the output increased from 263,000 tons in 1871 to 1,503,000 tons in 1904–05 and 2,632,000 tons in 1912 In the brewing industry Germany stands unrivaled The best beer is made in Bavaria, numerous breweries, however, are to be found all over the Empire Although the number of breweries has been steadily decreasing, their number in the beer-excise district (i e, Germany exclusive of Bavaria, Wurttemberg, Baden, and Alsace-Lorraine) having been 11,564 in 1880 and 4204 in 1911, the production in this district increased from 474,124,000 gallons annually during 1875–84 to 910,000 000 gallons in 1911, and in the entire Empire from 859,188,000 gallons annually during 1875–84 to 1,570,000,000 gallons in 1911 The number of distilleries increased from 60,763 in 1895–96 to 67,236 in 1911, and the quantity of alcohol produced increased from 73,340,000 gallons to 80,122,000 gallons

In silver, gold, and jewelry work Augsburg and Nuremberg dispute with Munich and Berlin for preeminence, the manufacture of scientific and musical instruments being also important in these cities, while Berlin and Leipzig are among the leading cities of Europe in respect to type foundries, printing, and lithography In the manufacture of rubber and gutta-percha goods, glass and pottery ware, clocks, and carved wooden specialties, Germany occupies a leading position The chemical industry excels that of all other countries, and the same may be said of dyeing and bleaching works In 1907 there were 10,562 chemical plants employing 172,441 laborers Just as the technical progress made by German industries in the last three or four decades can be compared only with that of the United States, so do their economic aspects resemble most closely those of the United States The chief feature in common is the growing concentration of industry In no other country save the United States are the number and power of large industrial organizations so great,

and at the beginning of 1906 there were no less than 385 distinct associations for controlling output and prices

The disposition to increase the size of manufacturing establishments rather than increase the number is manifest in Germany as in the United States The number of large establishments has shown a much greater per cent of increase than the number of small ones This has led to the omission from the German reports, as in the case of the United States census, of the household and neighborhood industries and renders difficult a measurement of growth as to numbers of establishments, employees, or output, except as to very recent years The number of employees in "factories and similar establishments" was reported at 5,054,000 in 1903, 5,361,000 in 1904, and the "total population engaged in manufactures and mining" in 1910, 6,618,000

Railways Germany has the largest railway system in Europe, its railway density being second to that of the United Kingdom The railroad industry employs half a million persons and represents a capital investment of about $4,000,000,000 The first railway built in Germany was the Ludwigsbahn, connecting the cities of Nuremberg and Furth in Bavaria (a distance of about 4 miles) and opened for traffic in December, 1835 Trains began running on the Leipzig-Dresden line in 1837, and Prussia built the Berlin-Potsdam line in 1838 By 1846 only the minor states had no lines The railways at that time were, however, distributed over the country in closely knit groups, each centring around some large city, only in the north were the lines connected During the next 30 years railway construction was pushed with great energy, with a view to covering the old trade routes and important highways The following table shows the growth of railways from their inception until 1913

YEAR	Total length of railways, miles	State lines Length in miles	Private lines operated by the state	Private lines privately operated	Per cent of state lines to total
1835	4			4	
1840	341	29		312	8 5
1850	3,753	1,299	311	2,143	34 6
1880	20,627	1,040	2,634	7,591	50 4
1900	30,454	28,052	90	2,587	92 1
1906	35,509	32,283		3,227	90 9
1913	39,065	36,139		2,900	92 1

The most interesting fact brought out by the table is the increasing activity of the state in German railway industry The German Empire as such does not own, however, the railways, the state lines being owned separately by the various states Attempts to put the Imperial government in possession of the entire railway system have not been lacking, but thus far they have all failed because of the separatist sentiment, especially in the smaller southern states At present each of the German states has a railway system of its own, largely owned and operated by the respective governments, a small portion remaining in private hands Prussia is the most important railway owner, besides the Kingdom of Prussia only seven other states own more than 1000 kilometers (621 miles), their respective lengths in 1912 being as follows· Prussia and Hesse, 23,771 miles· Bavaria, 5183 miles, Saxony, 2058 miles, Baden, 1093 miles, Alsace-Lorraine, 1301 miles; Wurttemberg, 1293 miles, Mecklenburg-Schwerin, 681 miles Thus Prussia controls the railway situation by holding three-fifths of the entire system, and the eight largest states of the country have more than 90 per cent of all the railway lines The number of miles of railway per 1000 square miles of area is in Germany 188, France 154, Austria 115, Netherlands 153, Italy 99, United Kingdom 193, United States 85

Shipping and Navigation The shipping interests of Germany are second only to those of Great Britain and the United States, but while the merchant marine of the United States is engaged mainly in the coasting trade, that of Germany is engaged primarily in foreign commerce On Jan 1, 1913, the German merchant marine (only ships of more than 17 65 gross tonnage being considered) comprised 3,153,724 tons, of which 2098 steamers had 2,655,096 net tonnage and 2752 sailing vessels had 498,228 net tonnage The increase in the net tonnage of the merchant fleet from 1875 to 1911 was 173 per cent, the steamers having gained 1281 per cent The merchant marine of the Empire employed 75,130 persons in 1912, against 39,600 in 1881 and 40,400 in 1891 The number of vessels entering and clearing German ports was 224,268 with 60,134,000 tons in 1910, about 60 per cent of the total shipping was carried in German bottoms, while 20 years before only about 32 per cent of the total shipping was in German hands

The principal countries participating in the shipping of the German Empire are Great Britain, with about 55 per cent of the total foreign shipping of the country, Sweden, with about 12½ per cent, Denmark, with nearly 12 per cent, Norway, over 8 per cent, the Netherlands, over 4 per cent, and Russia, with 3 per cent The principal ports in the order of their importance are Hamburg, Bremen, Stettin, Danzig, Lubeck, Kiel, and Konigsberg, the first of these ranking close to London and New York in the amount of its shipping

Commerce The foreign commerce of the German Empire is subject to the regulations of the federal authorities, all of the states of the Empire together with Luxemburg joining in the so-called Zollverein, or customs union A few districts in Baden and on the Switzerland frontier, also the free haven of Hamburg, Bremen, Bremshaven, and Cuxhaven, and Emden are still unincluded Absolute free trade exists between the members of the union, and a uniform tariff is applied to all goods coming to any of the states from foreign countries In fact, the commercial regulations governing the customs union are exactly like those applying to the commercial relations of the individual States of the United States, and of each of those to the Federal government, with the single exception that in the United States all customs duties collected enter the Federal Treasury to be used solely by the Federal government, while in the German Empire the surplus over a certain sum is distributed among the members of the customs union in proportion to their population.

Germany is second only to Great Britain in the volume of foreign trade Unlike the United States, but like Great Britain, Germany imports more than it exports. In considering statistics of German commerce it is necessary to distinguish between "general commerce," which includes all imports and exports entering or leav-

ing Germany, and "special commerce," which includes only imports from foreign countries for consumption in Germany and exports of German products The geographical position of Germany in the middle of Europe favors a large transit trade, which swells the difference between "general" and "special" commerce to considerably more than a quarter of a billion dollars a year The following table shows the growth of special commerce since the formation of the Empire

YEAR	Imports	Exports
1872	$824,670,000	$593,096,000
1880	676,872,000	708,288,000
1890	1,016,974,000	811,580,000
1897	1,157,870,000	901,068,000
1900	1,438,234,000	1,131,214,000
1901	1,420,146,000	1,132,642,000
1904	1,633,695,000	1,265,074,000
1905	1,769,839,000	1,390,348,000
1912	2,544,557,000	2,131,718,000

Owing to the enormous industrial progress in the last few decades, Germany has become an importer of foodstuffs and raw material and an exporter of manufactured products Nearly one-third of the total imports consists of foodstuffs and other articles of consumption, raw materials and partly manufactured for industrial purposes constitute over one-half of the total, manufactured commodities make up less than one-fifth and are progressively diminishing, the remainder consists of the precious metals The principal articles of export are textiles, half finished and finished metals, manufactured food products, chemicals, machines, tools, and apparatus, coal, and leather goods The exact proportions of the four great classes of merchandise in the commerce of 1910 were as follows

	Imports	Exports
	Per cent	Per cent
Raw and partly manufactured materials	56 9	25 7
Foods and animals	27 8	10 0
Manufactures	15 3	64 2

The history of the commercial relations of the German Empire with other countries may be divided into three periods (1) that of free trade, (2) the tariff period, and (3) the treaty period During the first period, which lasted from the foundation of the Empire to 1879, there was a strong tendency to free trade, and duties so far as levied affected only a small number of articles, and that very slightly, being raised mainly for revenue purposes In 1879 a new customs tariff went into effect as the result of prolonged agitation on the part of the joint agricultural and industrial forces, who were clamoring for the protection of home industries That tariff has undergone numerous changes since the year of its promulgation, but the most important change—the one which marks the third period, since 1891—is that it has come to serve merely as an abstract basis for German foreign commercial relations, the real controlling factor being the tariff treaty or convention with respective foreign countries The general tariff is called autonomous to distinguish it from the special or treaty tariff According to existing methods every country which has a commercial treaty with Germany—and this is the case of nearly all countries of importance—enjoys the privilege of a much lower tariff than the autonomous one, in consideration of reciprocal concessions made to German goods, but those countries which make any discrimination against German goods may be subjected to an additional tariff, which may be several times the amount of the autonomous tariff on all products enumerated therein and a high duty on all goods on the free list The Tariff Law of 1902, which took effect in March, 1906, increases the duties on cereals from 120 to 250 per cent, compared with the autonomous tariff of 1879, on canned and preserved goods, between 50 and 360 per cent, on machinery and implements, between 60 and 110 per cent The new duties have been reduced by treaties with the leading nations of Europe and South and Central America, but no treaty has yet been concluded with the United States, which, however, enjoys most favored nation treatment by special agreement The chief countries participating in German trade are

COUNTRY	Per cent of total imports into Germany				Per cent of total exports from Germany			
	1890	1900	1905	1910	1890	1900	1905	1910
United States	9 5	16 9	13 5	13 2	12 2	9 3	9 3	8 1
Great Britain	15 0	13 9	10 5	8 6	20 7	19 2	18 1	14 7
Russia	12 7	11 9	14 7	16 2	6 1	6 8	6 3	8 0
Austria-Hungary	14 0	12 0	10 4	8 1	10 3	10 7	10 2	11 1
France	6 2	5 1	5 5	5 4	6 8	5 8	5 0	7 3
Argentina	1 8	3 9	5 0	4 2	—	1 4	2 3	2 5
British India	3 0	3 7	3 7	4 6	—	1 2	1 5	1 6
Belgium	7 4	3 6	3 7	3 5	4 4	5 3	5 4	5 7
Netherlands	7 3	3 6	3 5	3 4	7 6	8 3	7 7	7 2
Italy	3 3	3 1	2 9	3 0	2 8	2 7	3 0	3 0
Switzerland	4 1	2 8	2 6	2 1	5 3	6 2	6 3	6 1

One of the most significant facts brought out by the table above is the high position of the United States in the foreign trade of Germany. In the commerce of the United States Germany stands next to Great Britain, occupying the second place in imports and third in exports, sending, in 1913, 10 43 per cent of all imports and taking 13 45 per cent of exports But while the imports from Germany to the United States have risen only about 100 per cent as compared with 1891, the exports of the United States to Germany increased more than 200 per cent during that period, as the following table shows

YEAR	Exports to Germany from the United States	Imports from Germany into the United States
1891	$92,795,000	$97,316,000
1897	125,246,000	111,211,000
1901	191,780,000	100,445,000
1905	194,220,000	118,268,000
1913	331,684,000	189,963,000
1914	344,794,276	189,919,000

The most important German imports from the United States are cotton, copper, lard, petroleum, lumber, wheat, maize, dried fruits, machinery, and meats. Up to about the year 1900 all classes of American imports showed a rising tendency, since then, however, a decline has set in in the importation of American food products, excepting dried fruits, due in large part to the fact that the United States has less foodstuffs for export than in earlier years, while the importation of those raw materials which are indispensable to German industry has continued

to increase The following table shows the movement of the leading American imports since 1897, and brings out clearly the reduction that has set in of late years in the importation of American food products due to the small supply which the United States has for exportation

LEADING IMPORTS FROM THE UNITED STATES

(*Millions of dollars*)

	1897	1901	1904	1905	1913
Cotton	40 7	55 5	80 3	69 9	146 1
Copper	12 1	14 7	28 5	32 0	41 7
Petroleum	10 8	13 4	14 5	12 4	9 3
Lumber	3 5	3 9	6 3	8 5	9 1
Dried fruits	2 2	2 0	4 5	4 2	4 7
Lard	14 2	19 3	15 5	20 2	19 7
Wheat	7 5	39 3	6 3	2 3	12 1
Maize	15 1	19 5	4 6	12 7	3 7
Fresh meats	5 1	3 6	0 9	2 9	0 7

The United States supplies to Germany about three-fourths of its cotton, nearly nine-tenths of its copper, and almost the whole of its lard importation The total value of exports from the United States to Germany has grown from $187,347,889 in 1900 to $331,684,212 in 1913 the imports from Germany have grown from $97,-347,700 in 1900 to $188,963,171 in 1913, the excess of exports over imports from $89,973,189 to $142,721,141 In considering the balance of trade, it should be noted, however, that it is not really so unfavorable to Germany as it appears on the face of the export and import figures The trade of America with Germany is carried on in German vessels, and the freight charges on American goods constitute no unimportant German asset against the United States, likewise the large sums paid annually by American travelers to German steamship companies The principal imports of Germany in 1912 were as follows.

(*Millions of dollars*)

Agricultural products and foodstuffs	1641 0
Mineral raw materials	242 7
Textile materials and manufactures	201 2
Base metal and manufactures thereof	131 3
Chemical and pharmaceutical products	90 3
Precious metals and manufactures thereof	96 5
Leather and leather goods	37 9
Machinery and electrotechnical goods	26 8
Manufactures of wood	20 9
Books, statuary, and pictures	9 8

The principal exports of Germany in 1912 were as follows

(*Millions of dollars*)

Agricultural products and foodstuffs	397 4
Base metal and manufactures thereof	390 1
Textile materials and manufactures	346 0
Machinery and electrotechnical goods	241 1
Chemical and pharmaceutical products	195 2
Mineral raw materials	180 7
Leather and leather goods	120 3
Paper and paper goods	52 4
Firearms, clocks, and toys	52 1
Precious metals and manufactures of	49 8

For an account of the colonial commerce of Germany, see *Colonies* in this article

Banking. At the head of the German banking system is the Imperial Bank (the Reichsbank) Founded in 1875 by an Act of the German Reichstag, it has been ever since the leading bank of issue and, in addition to other banking operations, has served as the depository of the Imperial Treasury Although practically a private stock company, its management is vested in a board of directors appointed by the government and subject to the orders of the Chancellor of the Empire The stockholders are represented by a general assembly, electing in turn a central committee, which makes monthly examinations of the affairs of the bank, and whose consent or advice is asked in certain matters by the board of directors The bank keeps on deposit all moneys intrusted to it by the Imperial Treasury and attends to all collections and disbursements on its account without any compensation Nor are the financial advantages derived by the government from the operations of the bank limited to that alone The profits of the bank are distributed as follows first, an annual dividend of 3½ per cent on the capital stock of 180,000,000 marks ($42,-840,000) is distributed among the stockholders, second, 10 per cent of the remaining surplus is added to the reserve fund, third, the remaining surplus is divided in the proportion of one-fourth to the shareholders and three-fourths to the Imperial Treasury

The Imperial Bank of Germany is not the sole bank of issue in the country At the time of the enactment of the bank regulations for the Empire, in 1875, 32 other banks were authorized to issue bank notes, the total uncovered note circulation having then been fixed at $91,630,000, of which $59,500,000 were allotted to the Imperial Bank and the remainder apportioned among the rest according to their capital stock Since then the number of these banks has gradually diminished, the allotment of the bank-note issue of all such being transferred to the Imperial Bank In 1914 only the following five banks still retained the right of issue

	Capital stock	Authorized note issue
Imperial Bank	$42,840,000	$130,900,000
Bavarian Bank of Issue	1,785,000	7,616,000
Saxon Bank	7,140,000	3,991,498
Wurttemberg Bank of Issue	2,142,000	2,380,000
Bank of Baden	2,142,000	2,380,000
Total	$56,049,000	$147,267,498

These banks may issue notes also in excess of the allotments indicated above, but all such amounts are subject to a tax of 5 per cent The growth of the business of the Imperial Bank from the time of its foundation may be seen from the following figures the total amount of all kinds of transactions had increased from $8,734,000,000 in 1876 to $103,500,000,000 in 1910 An important business carried on by the Imperial Bank is that in connection with its clearing-house department The latter was founded in 1883, and the volume of clearings is behind only those of the London and New York houses, exceeding $4,760,000,000 per annum Since its organization clearing houses have been established in 22 other cities of Germany, the more important being in Frankfurt, Stuttgart, Cologne, Leipzig, Dresden, Hamburg, Nuremberg, Hanover, Mannheim, Dortmund, Elberfeld, Breslau, Chemnitz, Munich, Berlin, Brunswick, and Bremen In addition to the banks of issue and the branch banks mentioned above, there are about 400 other banks organized as stock companies, whose total capital stock in 1910 exceeded $683,800,000, besides numerous private banks, some of which, like the Rothschilds or Bleichroder, are among the foremost banking

institutions of the world There are also several mortgage banks (Hypothekenbanken—credit foncier) to minister to the wants of the agricultural population, people's banks (Volksbanken) or cooperative loan associations which lend small amounts to needy artisans and owners of workshops, and finally the Prussian Maritime Association, for a description of which, as well as of the most important Berlin banks, the reader is referred to the paragraph on *Banking*, under PRUSSIA Of savings banks there were in Germany 3039, with 7186 branches, in 1911. The number of accounts was 22,350,000, and the aggregate deposits amounted to $4,241,000,000, while the deposits in the postal savings banks amount to over $1,000,000,000 In German banking, as in German industry, there prevails a strong tendency towards unification and concentration

Government. The constitution of the Empire bears the date of April 16, 1871 It is a written instrument and enumerates with considerable detail the powers and relations of the different organs of government It may be amended by the Imperial Legislature, according to the usual processes of legislation, except that 14 negative votes in the Federal Council will defeat an amendment, and that those provisions which guarantee specific rights to individual states are unamendable The Empire which this constitution created consists of 26 states, four kingdoms, six grand duchies, five duchies, seven principalities, three free cities, and Alsace-Lorraine, all under the presidency of the King of Prussia, who bears the title of German Emperor (Art II) It is not, however, a union of equals, for some of the states enjoy specific privileges which do not belong to others Of these, Prussia is the most highly favored She has the hereditary right to the presidency of the union, her Prime Minister is the Chancellor of the Empire, her representation in the Federal Council is large enough to prevent changes in the constitution without her consent, she has the casting vote in case of a tie in the Federal Council, and the chairmanship of all the standing committees except one in that body Among the states upon whom special privileges were bestowed as inducements to enter the union are Bavaria, Wurttemberg, and Baden. They are all exempt from Imperial excises on domestic liquors and beer, while Bavaria and Wurttemberg have their own postal and telegraph systems and, with certain restrictions, their own military systems Bavaria, moreover, is exempt from the operation of the Imperial laws for the regulation of railroads except for purposes of military defense and from the Imperial law of residence and settlement Bavaria, Wurttemberg, and Saxony are entitled to seats in the standing committees of the Federal Council on Foreign Affairs and on Army and Fortifications, the chairmanship of the first-mentioned committee belonging to Bavaria The constitution contains a guarantee that no state so privileged shall be deprived of its rights without its consent (Art LXXVIII) The German Imperial government may be described as a federal representative system, containing democratic and elective elements on the one hand and monarchic and hereditary elements on the other Its federal feature is shown in the constitutional division of the powers of government between the central government and the state governments and the marking out of a sphere of activity for each. The elective and democratic elements appear in the structure of the Reichstag, or National Diet, while the presidency of the Empire furnishes the monarchic and hereditary features In regard to the methods of governing, the Imperial rule is not parliamentary in the sense of parliamentary government in England, as there is no provision for a responsible ministry

For the purposes of legislation the constitution provides for a national Parliament, the Reichstag, representing the nation as a whole, and the Federal Council, or Bundesrat, representing the individual states The latter is, to a certain extent, modeled after the old Diet of the Confederation It is composed of delegates chosen by the governments of the several states that compose the Empire They are without definite tenure and are apportioned without much regard to population, but according to the artificial plan of the old confederation The number of votes in the Bundesrat, or Federal Council, is 61, of which Prussia has 17, Bavaria six, Saxony and Wurttemberg four each, Baden, Hesse, and Alsace-Lorraine three each, Brunswick and Mecklenburg-Schwerin two each, and the other states one each The members have the character of ambassadors and are entitled to the same privileges that are accorded the diplomatic representatives of foreign states They vote according to instructions from their governments, and uninstructed votes are not counted In case a state has more than one vote, the delegation from the state must vote as a unit, but the entire vote to which the state is entitled may be cast by a portion of its representatives It is left to each state to prescribe the qualifications of its representatives in the Federal Council The Imperial constitution and the statutes, however, prescribe a number of disqualifications, most of which relate to the holding of other incompatible offices at the same time

The Reichstag consists of representatives chosen for a term of five years by direct universal suffrage and secret ballot By universal suffrage is meant the suffrage of all male citizens who have attained the age of 25 years. Those who are in active military or naval service, those who are subject to guardianship, or who are bankrupt or insolvent, or in receipt of poor relief, or condemned to the loss of civil or political rights, are disqualified from the exercise of the suffrage There are at present 397 members of the Reichstag, the number as well as the character of the constituencies having remained unchanged since 1874 Of these Prussia has 236, or about three-fifths of the whole number They are chosen by single district ticket and are uninstructed A Law of May, 1906, provides for the payment of members The power of calling, opening, adjourning, and proroguing both the Reichstag and the Federal Council and of dissolving the former (with the consent of the latter) is a prerogative of the Emperor He must, however, call them annually, and in case of a dissolution he is bound to order the elections within 60 days and call the new Reichstag together within 90 days The Reichstag is the judge of the elections and qualifications of its members and has power over its own internal organization and procedure, except that its sessions must be public There are constitutional limitations, however, on the power of the Federal Council in this respect; for the president is designated by the consti-

tution, and the membership of some of its important standing committees is determined by the same authority So far as the initiation of legislative measures is concerned, the two representative bodies are theoretically on an equality At the same time it is the Federal Council which initiates all important legislation In the Federal Council each government represented may introduce measures, and it is made the constitutional duty of the president to submit them to deliberation In the Reichstag the initiation of measures is regulated by a rule of the House

Unlike the French Parliament, the powers of the German Imperial Legislature are enumerated in the constitution They include the regulation of foreign and interstate commerce, with certain exceptions in the case of Bavaria and Wurttemberg, the regulation of the monetary system, the regulation of the criminal law, private law and judicial organization and procedure throughout the Empire, the regulation of citizenship, medical and veterinary practice, the regulation of the customs and the excise upon tobacco, salt, spirituous liquors, beer, sugar, etc , the regulation of the military and naval systems, the enactment of measures for the execution of the laws, and the settlement of constitutional conflicts within a state in certain contingencies It will be seen from the enumeration that the power of the German Legislature extends to many subjects which in other states having the federal system of government are left to the regulation of the individual states As a general thing, the power of the Imperial Legislature over these subjects is not exclusive, but they may be regulated by the states in the absence of Imperial legislation Moreover, in the domain of interstate and foreign relations, the individual states may conclude treaties among themselves for the regulation of their postal and telegraph communication, and even with foreign countries for the regulation of matters of local concern, and to that end may send and receive ambassadors There has never developed a state's rights doctrine in the German Empire, for the reason that the federal union was not the result of an agreement among the states, as in America, but was called into existence by war and coercion on the part of Prussia

The Imperial executive power is vested in the King of Prussia, who is president of the union, and who bears the title of German Emperor (Art II). The succession is regulated by the Prussian constitution, which makes the crown hereditary in the male branch of the royal house by right of primogeniture and agnatic lineal succession During the minority of the King the regency is held by the nearest agnate, or, if there be no such agnate, then the Prussian Landtag shall choose a regent The King attains his majority at 18 and is irresponsible and inviolable As Emperor, he is vested with the power of appointing and receiving ambassadors, other public ministers, and consuls, of negotiating treaties, of waging defensive war, and, with the consent of the Federal Council, offensive war, of commanding the army and navy, of promulgating the laws and supervising their execution He has no veto on Imperial legislation In supervising the execution of the Imperial laws, which are for the most part administered by the state governments at their own expense, he addresses himself, through the Chancellor, to the state executives, and in case of their refusal to carry out the Imperial will, resort is had to federal execution—i e, force is brought to bear upon the recalcitrant state (Art XIX) In the enforcement of the laws, however, for the collection of the Imperial taxes and for the regulation of postal and telegraphic administration, the Emperor does not rely upon the states, but acts through Imperial officials He appoints all the officials in the Imperial service and may dismiss them There is an exception, however, in the case of the Imperial judicial officers, who are appointed by the Emperor upon the nomination of the Federal Council, and who cannot be removed by the Emperor In addition to these powers, which belong to the president of the federal union as Emperor, he has a series of important functions as King of Prussia

The constitution requires that all the official acts of the Emperor except those which relate to the command of the army shall be countersigned by an officer called the Imperial Chancellor, appointed by the Emperor and removable at his pleasure (Art XVII) By this act the Chancellor assumes responsibility for the measure, thus insuring the irresponsibility of the Emperor The Chancellor's responsibility, however, is not to the Legislature, but to the Emperor, for the parliamentary system of government does not exist in the Empire If, therefore, the Reichstag refuses to pass his measures or votes a resolution of censure against him, he does not resign, but continues to hold his office, and if he thinks the action of the Reichstag is not the will of the people he may request the Emperor to dissolve it and order a new election In recent years there has been a movement looking to the establishment of ministerial responsibility Several notable precedents have been made. In 1908 Chancellor von Bulow resigned soon after the Reichstag failed to pass his inheritance tax bill On Jan 30, 1913, a resolution of "no confidence" passed the Reichstag because of Prussia's attitude towards the Poles, on Dec 4, 1913, another such resolution passed the Reichstag on account of the conduct of the military authorities at Zabern in Alsace The Chancellor is president of the Federal Council and has a seat in the Reichstag, where he appears as the chief defender of the policy of the government and the champion of its measures He is also the head of the Imperial administration and supervises in the name of the Emperor the execution of the Imperial laws To aid him there are at present 13 departments of administration, each under the control of a secretary They are not his colleagues, but his subordinates; for there is no Imperial cabinet in the sense in which the term is usually understood A Law of 1878 authorizes the Chancellor to appoint a responsible vice chancellor to aid him when, from pressure of business or other cause, he is unable to discharge his duties It should also be noted that another important organ of administration is the Federal Council, in fact, the German commentators on the Imperial constitution treat it as an organ of administration rather than as a chamber of the Legislature Its most important administrative functions are the formulation of rules for the guidance of the administration, the preparation of the ordinances necessary for the execution of the laws, the issuing of decrees for the coercion of recalcitrant states of the Empire, and a wide

participation in the appointment of Imperial officials Under the last head may be mentioned the nomination of the judges of the Supreme Court of the Empire (*Reichsgericht*) and the election of the members of the Imperial Court of Accounts In spite of a democratically elected Reichstag, the German government is essentially an autocratic one The Reichstag is the voice, but not the will, of the German people, hence its main function is merely to criticize It is still in the protesting stage of parliamentary development, not unlike the English House of Commons in the time of the Stuarts The predominant body, then, is the Federal Council, but this chamber is controlled by Prussia, where the King is all but absolute, asserting openly the doctrine of "divine right" So it follows that while the Kaiser directly exercises little power, indirectly as King of Prussia he completely shapes the policies of the Empire The citadel of absolutism in Germany is Prussia and for this reason the radical elements in Germany have turned their attention to the democratization of Prussia

When we turn to the judicial system of the Empire, we find few provisions in the constitution which bear upon the subject—no provision for a supreme court or inferior courts, no apportionment of judicial power between the Empire on the one hand and the states on the other, according to the federal system of government, and no guarantees of judicial procedure such as constitute so notable a feature in the Constitution of the United States The only judicial tribunal in the Empire which has a constitutional basis is the Federal Council, which is designated as a court for the settlement of public-law controversies between states and of constitutional conflicts within states, in both cases when appealed to by one of the parties With these exceptions everything relating to the organization, jurisdiction, and procedure of the German courts is left to the regulation of the Legislature, thus making the judicial system a purely statutory creation It was not until 1877 that the Imperial Legislature passed an act for the organization of the courts (*Gerichtsverfassungsgesetz*) At the same time Imperial codes of civil and criminal procedure were completed and, with the Imperial Judiciary Act for the organization of the courts, went into effect Oct 1, 1879 An Imperial code of criminal law was completed in 1870 and revised in 1871 and 1876, and more recently (1900) an Imperial civil code was put in force

The result of all this legislation was the creation for the Empire of a uniform system of courts organized upon Imperial plan, and applying the law, which is not uniform throughout the Empire, according to a uniform system of procedure—an achievement which has done much to bring about the unification of the German states The Imperial Judiciary Act of 1877 created a system of courts of four grades, the lowest being the district court (*Amtsgericht*) This is a court of first instance for the trial of petty civil and criminal cases When hearing civil cases, the court is held by a single judge, in criminal cases the judge associates with himself two laymen called *Schoffen* Next above the district courts are the territorial courts (*Landesgerichte*), consisting of from three to five judges and divided into civil and criminal chambers They hear appeals from the lower courts and have a more extensive original jurisdiction in civil and criminal matters For the trial of important criminal cases jury courts are constituted periodically in connection with the territorial courts They consist of a bench of three judges and 12 jurors Next in the hierarchy are the superior courts (*Oberlandesgerichte*), likewise divided into civil and criminal senates, the usual number of judges in a criminal senate being seven They have no original jurisdiction, being exclusively courts of appeal from the territorial courts At present there are 28 superior courts in the Empire, 15 of which are in Prussia As a result of a special provision, Bavaria alone has an *Oberstes Landesgericht* of 15 judges, which has its seat at Munich Standing at the top of the judicial hierarchy is the Imperial Court (*Reichsgericht*), which has its seat at Leipzig in Saxony It is composed of four criminal senates and six civil senates, with an aggregate membership of over 90 judges The judges are appointed by the Emperor, upon the nomination of the Federal Council Their tenure is for life, and they are irremovable by any authority except the court itself acting as a disciplinary tribunal The Imperial Court has no original jurisdiction in civil matters Its appellate jurisdiction in civil matters extends to cases appealed from the superior courts, the consular courts, and the Imperial Patent Office Administrative Court The criminal jurisdiction of the Imperial Court extends in first and last instance to all cases of high treason against the Emperor or the Empire, to appeals in certain cases from the decisions of the territorial courts and the jury courts, and to appeals from decisions of the consular courts

The position of the judiciary is one of absolute independence of the administration The judges can neither be removed, transferred to less desirable judicial stations, nor retired on pension against their will All the judges (except those of the Imperial Court), about 8000 in number, are appointed and paid by the governments of the states in which they discharge their functions, and they are regarded as state judges, although their positions are created by Imperial law, and their qualifications and duties are prescribed by the same authority Unlike the American, the German courts have no power to declare either state or Imperial laws unconstitutional

The Germans—like the French, from whom they have borrowed many legal institutions—have attempted to separate the spheres of justice and administration and have accordingly intrusted the decisions of administrative controversies, not to the regular judicial courts, as is done in the United States and England, but to special tribunals called administrative courts, composed partly of trained jurists and partly of active administrators The judges of the German administrative courts, unlike those of France, however, have a position of independence and cannot be removed at the pleasure of the Emperor, by whom they are appointed. The most important Imperial administrative courts are the poor-law board, the railway court, the patent-office court, and the marine office If conflicts of jurisdiction occur between the administrative and judicial courts, the proper forum is determined by the Imperial Court, there being no provision for a tribunal of conflicts, as in France

Finally, it should be said that there is little

or no Imperial local government in Germany, since the Imperial laws are for the most part administered by the state governments under the supervision of the Emperor The chief local administrative activity of the Empire, therefore, consists of such supervisory service as may be necessary to insure the strict enforcement of the Imperial laws by the state authorities For local government in Germany, see PRUSSIA

Finances The finances of the Empire resemble, in a general way, those of the United States in that they embrace comparatively few items of revenue and expenditure The Imperial government cannot levy any taxes except customs and excise duties The bulk of its revenues is, therefore, derived from these two sources Excise duties are levied on tobacco, beer, liquors, salt, and sugar The post and telegraph, both of which are owned and operated by the government, the railways of Alsace-Lorraine, and stamp taxes bring in some additional revenue, which is, however, insufficient to cover the expenditures of the Empire The deficit is covered by contributions from the several states called "Matricular Beitrage," and levied on each state in proportion to its population Prussia is assessed more than 60 per cent of the entire federal contribution

The chief items of expenditure are those for the army and navy, which together absorb more than a third of the entire expenditure The Imperial Treasury spends one-tenth of the budget, and for the service of the debt of the Empire stands the next largest item, exceeding $54,000,000 per annum, or more than 5 per cent of the budget The growth of the budget of the Empire from its foundation is shown in the following table

YEAR	Budget	State contributions
1872	$83,530,860	$23,002,224
1882	141,217,776	24,582,782
1892	266,303,198	77,762,692
1902	559,238,596	135,882,054
1907	570,563,000	68,483,000
1913	879,650,000	62,196,560

The total debt of the Empire amounted in 1912 to $1,177,418,000, of which about 6 per cent was unfunded. Of this, over one-half is at the rate of 3 per cent interest, the remainder chiefly 3½ per cent The first loan raised by the Imperial government was for more than $3,808,000 in 1877 The growth of the debt since then has been as follows 1880, $51,897,804, 1890, $266,079,716, 1900, $547,043,000, 1905, $790,993,000; 1912, $1,177,418,000

Army. The German army, as organized in peace, consists of 25 army corps, recruited as follows in territorial military districts in the Kingdom of Prussia, Baden, and Hesse, 16, the Prussian Guard Corps, from the entire kingdom, 1, in Saxony, 2, in Wurttemberg, 1, the Reichland (Alsace and Lorraine), 2, Bavaria, 3, in all, 25 army corps and 1 permanent cavalry division, which, with the active reserve troops, amounts to about 1,250,000 combatants Adding to this 750,000, the strength of the Landwehr immediately available, Germany can mobilize at once about 2,000,000 trained men In addition there are about 1,500,000 partially trained, a large number of garrison troops, and the Landsturm, or last reserve, which includes all the able-bodied men not already called to the colors. In the German army provision for organizing the corps into armies is made by assigning corps to inspection districts, each of which is provided with a headquarters and staff Normally 2 regiments of infantry (6 battalions) form a brigade, 2 brigades a division, and 2 divisions an army corps There are 10 divisions, however, which have 3 brigades To each infantry division is attached an artillery brigade of 12 batteries (72 guns), a regiment of 4 squadrons of cavalry, to each army corps, 4 batteries of howitzers, a pioneer (engineer) battalion, and a battalion of rifles (Jager) are also attached Cyclist companies, of which there are 18, are assigned as needed Field batteries have 6 guns instead of 4, the number used in the French and United States army battery The complete German division of 2 brigades has about 14,000 combatants, the corps of 2 divisions, 30,000 The division, increased in war to 3 brigades, gives 6 brigades to the war corps, amounting in all to about 43,000 combatants, as compared with 33,000 in the French army and about 44,000 in the two divisions of the field army of the United States

There is but one permanent cavalry division In war provision is made for the immediate formation of eight more from existing cavalry brigades, regiments, and squadrons Strength, 3 brigades of 2 regiments each, with 2 or 3 batteries of horse artillery—in all, 24 squadrons and 8 or 12 guns The French army, on the other hand, maintains 10 permanent cavalry divisions

Unit of Organization *Infantry*—Four companies to the battalion, 3 battalions to the regiment, 2 regiments to the brigade, 2 brigades to the division, with one of the divisions in a corps having an extra battalion of sharpshooters (Jagers, or Schutzen) The war-strength battalion counts about 25 officers and 1000 rifles, which gives for the war company about 250 as compared with the American company of 142 men

Cavalry—Five squadrons to the regiment, 2 regiments to the brigade The German squadron should not be confused with the American squadron The former consists, on a war footing, of 6 officers and 172 men, the latter of 14 officers and 363 men, divided into 4 troops One of the five German squadrons composing a regiment will probably be left at the regimental depot to collect and train recruits to supply the four squadrons in the field See CAVALRY

Field Artillery—Three batteries to the battalion, 2 battalions to the regiment, 2 regiments to the brigade, as in the United States army, except that the American battery has only 4 guns, like the French, the German light battery 6 guns Horse batteries have 4 guns In peace the batteries vary in strength from 4 officers and 102 men to 4 officers and 128 men In war the battery counts 5 officers and 150 men, as compared with the American battery of 5 officers and 171 men. Each German battalion in war has in addition a light ammunition column of 4 officers and 188 men

Foot Artillery—Organization varies greatly. A typical formation is 4 batteries to the battalion, 2 battalions to the regiment There are 24 regiments The heavy howitzer battalion numbers 1230 officers and men, including light ammunition train One battalion of these is assigned to each corps in war. Each has 4

batteries of 4 guns each Field and foot (fortress) artillery officers are on one list Fortress artillery garrisons the land defenses Seacoast fortifications are under the navy, with one or two exceptions

Aeronautical Corps—Under the Law of 1913, 5 aeroplane battalions (17 companies) were organized There are at present (1914) between 25 and 30 dirigibles The total *personnel*, 173 officers and about 4500 enlisted men

Technical Troops—It is necessary to consider engineer and signal troops together if we wish to make any comparison between these organizations and those of the United States Germany divides troops of this class into pioneer troops, and Verkerstruppen (lit, communication troops). The latter are further divided into railroad troops, telegraph troops, aerostation and aviation troops, automobile troops, etc The 18 companies of cyclists are included in the strength of the infantry See ENGINEERS, CORPS OF

Supply Train It consists of 25 battalions Each battalion is composed of 3 companies and a bakery detachment Strength, 631 officers, 10,961 enlisted men

Sanitary Troops—About 2300 officers and 4500 men, capable of required expansion in time of war.

Veterinarians—Between 700 and 800 Horses, peace, 160,000

Officers—A noticeable feature of the German Officer Corps is the large number of nonregimental officers, about 3000, which makes it possible to perform all administrative and staff duties without depriving the line troops of their officers, as in the American system

New Laws—The effect of the Laws of 1911, 1912, and 1913 will result, at the end of 1915, in a considerable increase in the permanent peace establishment and consequently in the number of trained men available at the outbreak of war The intent of the Law of 1913 was to increase the annual number of recruits, the number of organizations, and the number of balanced units, and to decrease the average age of the men of the field army At the same time the "war chest" was increased from $30,000,000 to $90,000,000 in gold and silver For the year 1914 the military budget amounts to about $300,000,000 The "war chest" is an additional cash emergency fund in the form of gold and silver

Total Peace Strength—It is estimated that the progressive increase of the standing army, provided for in the Law of 1913, will, in 1915, result as follows 669 battalions of infantry, 550 squadrons of cavalry, 642 batteries of field artillery, 55 battalions of foot artillery, 44 battalions of engineers, 31 battalions of communication troops, 25 battalions of supply troops, which, with miscellaneous small corps, staff, etc, aggregate the following numbers in the classes stated (the figures are given in round numbers) 36,000 officers, 10,000 officials, 18,000 one-year volunteers, 771,000 men, grand total, 835,000 for the standing army in peace in 1915

Total War Strength—The peace army raised to war strength under the provisions of the Law of 1913, by adding the active reserve, gives about 1,250,000 trained combatants for the initial mobilization, or first line army When to this is added 750,000 men composing the mobile Landwehre, or second line army, there results a mobile force of trained men amounting to approximately 2,000,000 In addition to this force it is estimated that there are about 2,500,000 wholly or partially trained men for home defense, made up of the second Ban of the Landwehr, of garrison units, and of the Landsturm, or last reserve, giving a grand total, for the defense of Germany, of at least 4,500,000 trained men Some estimates make this total 5,000,000, including untrained men France can mobilize about 3,500,000 in all

Colonial Troops—At the outbreak of the War in Europe (q v), 1914, there were at Kiaochow about 2700 marines and sailors, supplemented by native troops Colonial troops, not included in the army, 340 officers, 2250 noncommissioned officers and men, 3830 native soldiers In German Southwest Africa there was a German force of 150 officers and 2000 men In addition there were 600 native police with German officers

Administration—Under the constitution of the Empire the German Emperor is commander in chief of all the forces To the Bavarian troops, however, the oath of fidelity is not administered in time of peace Bavaria, Saxony, and Wurttemberg have their own war ministers, but are more or less subject to the control of the Prussian War Office

Arms—The infantry uses the Mauser magazine rifle, calibre 0 311 inch, the cavalry, the carbine of the same type Field and horse artillery use a Krupp gun firing a 15-pound projectile The light and heavy field howitzers fire 30- and 94-pound projectiles respectively The fighting strength of the German army, or the initial mobilization, is estimated at 1,000,000 rifles, 80,000 sabres, 5500 field guns, France, 650,000 rifles, 60,000 sabres, 3000 field guns

Service—Military service is obligatory, with certain exemptions Liability (Wehrpflicht) commences at 17 and ends at 45, active service (Heerpflicht) begins at 20 Every boy who enlists before 20 has a liability of only 19 years (1) Active service, first line army, is for 7 years, 2 with the colors and 5 in the reserve, except in the mounted branches, in which the periods are 3 and 4 In the active reserve training is for a period of not more than 8 weeks twice during the reserve period (2) Service in the first Ban (calling out) of the Landwehr (land defense), or second line army, is for 5 years Training for from 8 to 14 days twice during the period (3) Service in the second Ban of the Landwehr for 7 years. No training during this period Total service in the active army and Landwehr, 19 years, from the age of 20 to 39 (4) Service in the Landsturm (lit, land uprising) composed of 2 Bans—first Ban, composed of those between 17 and 39 who have received no military training, second Ban, composed of all between the ages of 39 and 45, whether trained or not This reserve is for home defense, receives no training, and may be called out only by Imperial decree, or, in case of imminent war, by corps commanders or fortress governors One-year volunteers (amounting to about 18,000), known as Einjahrigfreiwilligers, made up of educated young men who pay their own expenses, are admitted and supply the commissioned *personnel* for the reserve and Landwehr troops The Ersatz (compensatory) reserve is composed of the annual surplus of those called to the colors They receive a certain amount of training Catholic clergymen, if ordained before the 1st of April of the seventh

year of their obligation, pass to the depot reserve, when they are exempt from drills Young men born in the island of Heligoland before the 11th of August, 1890, are entirely exempt from military service

Frontier—Seacoast and land frontier in all amounts to about 4600 miles The country is divided into 10 fortress inspection districts, each including fortified places The names of the districts and the fortresses on each are as follows 1 *Konigsberg* Konigsberg, Danzig, Pillau, Memel, Boyen 2 *Posen* Posen, Glogau, Neisse, Glatz 3 *Berlin* Spandau, Magdeburg, Torgau, Kustrin 4 *Mainz* Mainz, Ulm, Rastatt 5 *Metz* Metz, Diedenhofen, Bitsch 6 *Cologne* Cologne, Coblenz, Wesel, Saarlouis 7 *Kiel* Kiel, Friedrichsort, Cuxhaven, Geestemunde, Wilhelmshaven, Swinemunde. 8. *Thorn* Thorn, Grandanz, Vistula Passages, Dirschau 9 *Strassburg* Strassburg, New Breisach 10 *Munich* Munich, Ingolstadt, Germersheim

These are all connected by wire, and railways are so located and operated as to concentrate the army most efficiently at threatened points of the frontiers.*

Navy. Previous to 1848 none of the states of northern Germany possessed naval forces The blockade of the coast by Denmark in that year showed the value of a navy, and Prussia took immediate steps to organize one It grew but slowly until the Schleswig-Holstein War, when the necessity for an adequate force became again very apparent The growing Prussian navy became the navy of the North German Confederation in 1866, and this in turn formed the nucleus of the Imperial navy in 1871 It was not until 1882, however, that serious steps were taken to greatly augment it. In that year a definite building programme was adopted This was supplemented by another in 1888 The increasing commerce and wealth of Germany and the manifest desirability of a navy commensurate with the interests of the nation brought about the formation of the German Naval League (which now has 3600 branches and 1,100,000 members) and an energetic fight, led by the Emperor, for a strong navy. This fight resulted in the naval laws of 1898, 1900, 1906, and 1912, hereinafter mentioned After 1900 the growth of the fleet was very rapid.

The naval Act of 1900 is the real basis of the existing fleet It embodied in definite legislation the future scheme of construction, providing for the building and maintenance of a fleet of 38 battleships of the most powerful type and a corresponding number of cruisers, torpedo craft, and auxiliaries, as well as an extensive expansion of the dockyards The estimated cost of the fleet was $370,000,000, and of the dockyards and other matters, $100,000,000 The Act also provided for replacing the older ships when they reached a certain age The Acts of 1906 and 1912 added materially to the force previously contemplated. The total programme as defined in 1912 is to be completed in 1923 It provides for 41 battleships, 12 battle cruisers, and 30 small cruisers for the fleet, and 8 large cruisers and 10 small ones for foreign service The active fleet (High Seas Fleet) will consist of 1 fleet flagship, 3 squadrons of 8 battleships each, 8 large and 18 small cruisers, and such torpedo craft as may be assigned (See table hereinafter given) The cost of the navy has grown with its size In 1871 it was $6,000,000, in 1881, $6,750,000, in 1891, $21,350,000, in 1901, $51,400,000 and the budget for 1914–15, passed before war was foreseen, amounted to $117,000,000

As in the case of the army, the supreme command is vested in the Emperor, both in peace and war, and he alone presides over the whole navy All questions upon which the different bureaus or divisions of the navy are not agreed are referred directly to the Emperor for his decision The Emperor's principal aid is the Inspector General of the Navy The department is divided into two administrative bureaus—the Imperial Navy Office, which deals with everything that involves expense, and the Admiralty Staff (Admiralstab), which deals with everything that relates to command (including the Naval Intelligence Office, plans of operation, mobilization, training, etc) Aside from the chiefs of these bureaus, there are five other officers performing independent duties for which they are responsible to the Emperor alone These are the commander in chief in the Baltic, the commander in chief in the North Sea, the chief of the High Seas Fleet, the chief of the Cruiser Squadron, and the Inspector of Training

The *personnel* of the navy has been greatly increased since the beginning of the great war of 1914 Previous to the mobilization, by the provisions of the Naval Bill of 1914–15 it was to consist of 3760 commissioned officers and 75,468 men The line officers provided for were 2 grand admirals, 5 admirals, 12 vice admirals, 22 rear admirals, 379 captains and commanders, and 1991 other line officers The training of line officers consists of one year on a practice-ship, one year at the naval school (at Murwik near Flensburg), six months divided between the gunnery school, torpedo training ship, and the marine infantry, and lastly one year's practice training in the active fleet Engineer officers (about 600 before the mobilization) are first appointed to enlisted men's ratings, but wear a special uniform and are messed separately They have first a three months' course of instruction in military matters, then nine months on vessels of the High Seas Fleet, followed by promotion to petty officer's rank, then two years' service as petty officers in large ships and destroyers, and one year at one of the engineering schools (Kiel or Wilhelmshaven), followed by promotion to warrant officer, next, four years' training in practice work (usually about two years of this in destroyers), and lastly one more year at an engineering school, followed by promotion (if qualified) to the rank of engineer (corresponding rank of sublieutenant)

The enlisted force consists of the *Fleet* and the *Seewehr* Every German must serve either in the army or navy and cannot provide a substitute. The obligation commences at the age of 20 and continues seven years—the first three in active service and the remaining four in the reserve, when the annual exercises or manning of the fleet do not necessitate recall to service Each reservist is obliged to take two training courses of eight weeks during the reservist period. At the end of seven years the men enter

* In estimating the military strength of armies, either in peace or in war, care must be taken, in consulting authorities, to note which organizations are included and which are omitted, which are without staffs and what staffs are without organizations, the size of the basic units in war and in peace, whether officers, officials, administrative services, colonial and native troops are considered, the character and numbers of the several reserve quotas of trained and partially trained men, and to what extent the latter are available for war service

the *Seewehr*—in its first class for five years and in its second class until they complete their thirty-ninth year There is also an *Ersatz Reserve*, composed of men who have not served from various causes, such as excess of numbers, domestic reasons, slight physical defects, etc It serves to fill the vacancies in the complements when mobilization occurs In addition to the men serving their three years in the fleet there are others who have volunteered for longer periods, and these include nearly all petty officers and other persons who perform duties not practicable for short-term men

On Nov 1, 1914, the German fleet consisted of 16 battleships of the dreadnought type (3 others building), 22 older battleships, 3 battle cruisers (2 building), 9 armored cruisers, 39 cruisers and scouts (6 building), 152 destroyers (of these several lost—12 others building), 36 submarines completed (or nearly completed—at least one boat sunk in action, several boats building) The battle cruiser *Goeben* and the light cruiser *Breslau* have been sold to Turkey and are not included in the foregoing statement The latest reports concerning the naval air craft give the number of airships as 5, ordinary aeroplanes and hydroplanes as about 60, but, as such craft can be built rapidly, doubtless the numbers have been much increased The beginning of the organized air fleet was made in 1912. and though the disastrous accidents to L1 and L2 (see MILITARY AERONAUTICS) caused a temporary setback, the development of naval airships was soon resumed, partly through experiments with privately owned dirigibles, and revolving sheds for airships have been built at Cuxhaven and elsewhere

The German fleets were organized at the beginning of the war as follows

HIGH SEAS FLEET

Flagship *Friedrich der Grosse, 25d, 10g12, 22 k

1st b s Squadron
(25d–10g12–22 k)
*Ostfriesland
*Helgoland
*Thuringen
*Oldenburg

(19d–12g11–20k)
*Nassau
*Rheinland
*Posen
*Westfalen

2d b s Squadron
(13d–4g11–19k)
Schleswig-Holstein
Schlesien
Pommern
Hannover
Deutschland
Lothringen
Hessen
Preussen

3d b s Squadron
(25d–10g12–22)
*Kaiser
*Kaiserin
*Konig Albert
*Pr Reg Luitpold

(26 6d–10g12–23)
†*Konig
†*Markgraf
†*Grosser Kurfurst

†Not completed August 1

Cruiser Squadron
(25d–10g11–30k)
Seydlitz

(23d–10g11–28k)
Moltke

(19 5d–8g11–28k)
Von der Tann

(28d–8g12–30k)
Derflinger

8 unarmored C
(5d to 4d–27k to 28k)

Destroyers
7 flotillas, 12 boats each, 1 boat of each in reserve.
1st –0 55d–32k
2d –0 55d–32k
3d –0 64d–32k
4th –0 64d–32k
5th –0 62d–30k
6th –0 67d–30k
7th –0.53d–30k

Submarines
3 flotillas, 7 vessels each
1st –0 8d–17k–3t
2d –0 3d–12k–2t
3d –0 24d–12k–2t
4th and 5th flotillas probably formed since July 1

RESERVE FLEET

4th b s Squadron
(13d–4g11–18k)
Elsass
Brandenburg

(12d–4g9 4–18k)
Wittelsbach
Zahringen
Schwaben
Mecklenburg

5th b s Squadron
(12d–4g9 4–18k)
Wettin

(11d–4g9 4–18k)
Kaiser Barbarossa
K Karl der Grosse
K Wilhelm der Grosse
K Wilhelm II
K Friedrich III

Cruiser Squadron

(16d–12g8 2–25k)
Blucher

(12d–4g8 2–23k)
Scharnhorst
Gneisenau

(9 5–4g8 –21k)
Yorck
Roon

(9d–4g8 2–21k)
Friedrich Karl
Prinz Adalbert

(9d–2g9 4–20k)
Prinz Heinrich

(11d–4g9 4–18k)
Furst Bismarck

About 15 armored cruisers 2d to 4d, 18k to 21k

Unassigned

Two b s
(11d–4g11–17)
Worth
Brandenburg

8 armored coast defense vessels (4d–3g9 4–15k)

About 50 destroyers, probably mobilized in 4 flotillas

About 60 torpedo boats

Six protected cruisers of 6000 tons used in training

(NOTE Displacements are given in thousands of tons, thus, 12d is 12,000 tons, 5 5d is 5500 tons, 0 555d means 555 tons, 4g12 means 4 12-inch guns constitute the main battery, 12g11 means that 12 11-inch guns are the main armament, 30k means 30 knots' speed, 3t means 3 torpedo tubes, b s means battleship, a c, armored cruiser, c, cruiser, des, destroyer, sub, submarine, * means dreadnought or battle cruiser)

Germany has three navy yards Two of them are large and splendidly equipped establishments—one at Wilhelmshaven in the Jade estuary and the other at Kiel Both are fitted for repairing or building ships of the largest size Kiel has two dry docks (and one building) of sufficient size to take any battleship, but they are too short for battle cruisers Wilhelmshaven has four dry docks (and one building) for dreadnoughts, one of these capable of docking the largest battle cruisers The third navy yard is at Danzig It is fitted only for the building and care of small cruisers and torpedo craft

The Imperial navy had no war experience previous to the great war of 1914 In the wars of 1864 and 1866 the navy of Prussia and of the North German Confederation achieved nothing There were no important naval operations during the Franco-Prussian War, the navies of both powers exhibited a lack of energy and aggressiveness, the one single-ship action being a drawn battle in which neither side received much injury. See NAVIES

Money, Weights, and Measures. Gold is the single standard of value, silver being legal tender only for amounts not exceeding 20 marks (less than $5) The coining of money is in the hands of the Imperial government The standard unit is the mark, whose value is 23 821 cents United States gold The mark has 100 pfennigs The old thaler is equivalent to 3 marks The prevailing coins are the gold 5, 10, and 20 mark pieces, called the half crown, crown, and double crown respectively, the silver 1, 2, and 5 mark pieces, and bronze coins of smaller denominations.

The metric system has been in vogue since 1872.

Colonies. At the outbreak of the War in Europe (q v), 1914, the German colonies, or so-called protectorates, were Togo (acquired in 1884), Kamerun (1884), German Southwest Africa (1884), German East Africa (1885), German New Guinea (1884), German Samoa (1900), and the territory of Kiaochow (1897) German New Guinea included Kaiser-Wilhelmsland, the Bismarck Archipelago, and the German Solomon Islands, while administratively attached to it were the Micronesian islands acquired in 1899, viz, the Caroline, Pelew, Marshall, and Marianna islands (except Guam) The following table shows estimates for 1912

	AREA		POPULATION	
	Sq km	Sq m	Colored	White
Togo	87,200	33,668	1,003,240	372
Kamerun	790,000	305,019	3,500,000	1 537
Southwest Africa	835,100	322,432	87,770	14,816
East Africa	995,000	384,170	7,510,800	4,866
New Guinea	240,000	92,664	} 609,200	1,278
Carolines, etc	2,476	956		
Samoa	2,572	993	37,480	500
Kiaochow (1913)	552	213	192,000	4,470
Total	2,950,900	1,140,115	12,903,490	27,339

The German colonial system is that of a pure absolutism administered through a centralized bureaucracy Neither the natives nor the white inhabitants of the colonies have any voice in the fiscal or political administration of the territories The laws for the colonies are framed by the Imperial Parliament, and German citizens residing in the colonies enjoy the same civil rights as in the mother country The natives are not regarded as German citizens, but are allowed to acquire citizenship by naturalization in accordance with the general laws regulating such procedure A fundamental law in respect to the administration of colonies was laid down by the Reichstag in 1886 and subsequently amended in 1887 and 1888. The only exception, whereby the native element is recognized in the administration of colonial affairs, is in the case of some of the districts where it was thought advisable to placate the native chiefs by making them the medium of communication between the Imperial government and the native population

The decision as to the budget for the protectorates is nominally vested in the Emperor, though virtually it is in the hands of the Governor of the colony and his immediate subordinates The revenue is derived from taxation, sale or lease of public property, fees, and subventions from the home government There is a house tax applicable to both Europeans and natives The rate of the tax is expressed in money, but the natives are allowed to offer produce or labor as the equivalent of the tax The determination of the value of labor and natural products is left to the local authorities, thus permitting the exercise of a good deal of arbitrary power by the colonial officers Moreover, "measures are provided for the enforcement of the tax, and for this purpose forced labor is permitted" Experience has shown that the system is productive of excessive hardships for the natives and affords opportunity for the display of great cruelty by the local officers The revenues derived from the various sources in the protectorates are, however, generally far from being sufficient to cover the necessary expenses, and the home government finds it necessary to grant large subventions from year to year Extraordinary expenditures are generally met by loans The excess of ordinary expenditure over the ordinary, or colonial, revenue is covered by Imperial subvention Colonial revenue and expenditure respectively, for all the protectorates, have been as follows, in millions of marks in 1901, 7 82 and 39 94, in 1903, 10 10 and 40 05 in 1904, 13 58 and 101 15, in 1905, 15 30 and 204 68, in 1906, 18 21 and 101 18, in 1909, 42 63 and 68 20, in 1910, 48 72 and 82 43, in 1911, 47 99 and 97 13 The total estimated receipts for the fiscal year 1914 were 157,538,000 marks, made up as follows colonial receipts, 60,027,000 marks, territorial debt, 7,905,000, Imperial subvention, 31,961,000, loan, 57,600,000, "economies" (in Kiaochow), 45,000

Colonial Commerce—The combined imports and exports of the German protectorates increased from a value of 99,576,000 marks in 1902 to 193,101,000 in 1905, 254,692,000 in 1908, and 435,440,000 in 1911 Imports and exports have been as follows, in thousands of marks

	1905	1908	1909	1910	1911
Imports					
Africa	62,514	84,264	97,613	119,400	130,131
Pacific islands	8,858	7,593	9,799	9,441	12,081
Kiaochow *	69,176	69,041	65,464	69,375	114,938
Total	140,548	160,898	172,876	198,216	257,150
Exports					
Africa	23,438	37,726	58,264	82,643	81,579
Pacific islands	4,398	8,724	11,350	18,199	16,416
Kiaochow *	24,717	47,344	54,732	60,561	80,295
Total	52,553	93,794	124,346	161,403	178 290

* With hinterland

Imports from and exports to Germany in 1910 amounted to 95,090,000 and 73,210,000 marks respectively, in 1911, 104,826,000 and 73,818,000. If we take into account the fact that the greater part of German imports into the protectorates, except Kiaochow, represents supplies sent there by the government for the use of its troops, officials, and public works, the value of the German colonial trade becomes unimportant

Population The following table shows the area in square kilometers and in equivalent square miles of the states of the German Empire, their de facto population according to the censuses of Dec 1, 1910, and Dec 1, 1905, the percentage of increase from 1905 to 1910 and from 1871 (the year in which the Empire was established) to 1910, and the population per square kilometer in 1910 and 1871 Political status is indicated thus *k* kingdom, *g* grand duchy, *d* duchy, *p* principality, *fc* free city, *r* Reichsland (Imperial territory) Under Prussia are shown the constituent provinces, and under Bavaria are shown Bavaria proper (i e, the eastern part) and the detached Palatinate (west of the Rhine).

The only countries in the world exceeding Germany in population are China, India, Russia, and the United States During the past century German population has increased remarkably The average annual increase from 1816 to 1864 was 0 96 per cent, from 1864 to 1910, 1 09 per cent, from 1816 to 1910, 1 02 per cent. The population in 1816 was 24,833,000;

in 1820, 26,294,000, in 1830, 29,520,000, in 1840, 32,787,000, in 1850, 35,397,000, in 1860, 37,747,000; in 1864, 39,392,000, in 1870, 40,818,000, in 1871, 41,058,792, in 1880, 45,234,061 (average annual increase from 1871, 1 08 per cent), in 1890, 49,428,470 (annual increase, 0 89 per cent); in 1900, 56,367,178 (annual increase, 1 31 per cent); in 1905, 60,641,489 (annual increase, 1 46 per cent); in 1910, 64,925,993 (annual increase, 1 36 per cent), in 1919, 59,857,283

The density of population per square kilometer in 1910 was 120 04 (equivalent to 310 9 per square mile) For the sake of comparison the density per square kilometer in other countries is here shown England, 268 3 (United Kingdom, 144 2), Belgium, 252 07, Java and Madura, 228 87, Netherlands, 171 36, Japan, 139, Italy, 120 94 (about the same as the density of Germany), Luxemburg, 100 49, China proper, 78, Austria-Hungary, 76.01, France, 73 82, Denmark, 70 75, British India and native states, 68 61; Portugal, 64 8, Spain, 38 66, European Russia (without Poland), 24, Russian Poland, 74, United States, 11 96 (the most densely populated States of the United States, Rhode Island and Massachusetts, had a density per square kilometer in 1910 of 196 5 and 162 respectively) In Germany the density varies greatly, being least in agricultural Mecklenburg-Strelitz (36 3); in the industrial kingdom of Saxony it is 320 6

The estimated population of the Empire on June 30, 1912, was 66,146,000, and of the Zollgebiet (customs territory), 66,391,000, on June 30, 1914, 67,812,000 and 68,061,000

The foreign population at the 1900 census was 778,737, 1905, 1,028,560 1910, 1,259,873 (of whom 542,879 female) Of the foreigners in 1910, subjects of Austria (with Liechtenstein) numbered 634,983, Netherlands, 144,175, Russia (with Finland), 137,697, Italy, 104,204, Switzerland, 68,257, Hungary, 32,079, Denmark, 26,233, France, 19,140, United Kingdom and colonies, 18,319, United States and possessions, 17,572, Luxemburg, 14,356, Belgium, 13,455

German subjects of non-German blood exceed 4,000,000, of whom over three-fourths are Poles Others are Czechs, Lithuanians, Wends, Danes, French, Frisians, etc The Poles are found principally in Posen and Silesia, the Czechs in Silesia, the Wends in Silesia, Brandenburg, and Saxony (Kingdom), the Lithuanians in East Prussia, the French in Alsace-Lorraine, the Danes in Schleswig-Holstein The Poles retain their ideal of nationality and are essentially a hostile element in the Empire In 1910 Jews numbered 615,021, of whom two-thirds are in Prussia

STATES OF THE EMPIRE		AREA		POPULATION		INCR PER C		POP SQ KM	
		Sq km	Sq m	1910	1905	'05–'10	'71–'10	1910	1871
Prussia	(k)	348,779 9	134,663 9	40,165,219	37,293,264	7 7	62 7	115 2	70 8
East Prussia		37,002 0	14,286 5	2,064,175	2 030,176	1 7	13 2	55 8	49 3
West Prussia		25,554 7	9,866 7	1,703 474	1 641,874	3 8	29 6	66 7	51 5
Berlin (city)		63 4	24 5	2,071,257	2,040,148	1 5	150 7	32,664 5	13,951 4
Brandenburg		39,842 3	15,383 1	4,092,616	3,531,856	15 9	100 9	102 7	51 1
Pomerania		30,131 4	11,633 7	1,716 921	1,684,345	1 9	19 9	57 0	47 5
Posen		28,991 5	11,193 6	2,099,831	1,986,637	5 7	32 6	72 4	54 7
Silesia		40,335 1	15,573 4	5,225,962	4,942,725	5 7	41 0	129 6	92 0
Saxony		25,267 3	9,755 7	3,089,275	2,979 249	3 7	46 9	122 3	83 3
Schleswig-Holstein		19,018 8	7,343 2	1,621,004	1,504,248	7 8	55 1	85 2	55 0
Hanover		38,509 4	14,868 5	2,942,436	2,759,245	6 6	50 0	76 4	50 9
Westphalia		20,219 6	7,806 8	4,125,096	3 618,090	14 0	132 4	204 0	87 8
Hesse-Nassau		15,702 0	6,062 5	2,221,021	2,070,052	7 3	58 6	141 4	89 2
Rhine Province		27,000 2	10,424 8	7,121,140	6,436,337	10 6	99 0	263 7	132 6
Hohenzollern		1,142 2	441 0	71,011	68,282	4 0	8 3	62 2	57 4
Bavaria	(k)	75,870 2	29,293 5	6,887,291	6,524,372	5 6	41 6	90 8	64 1
Bavaria proper		69,942 2	27,004 7	5,950,206	5,638,539	5 5	40 4	85 1	60 6
Palatinate		5,928 0	2,288 8	937,085	885,833	5 8	52 4	158 1	103 8
Saxony	(k)	14,992 9	5,788 8	4,806,661	4,508,601	6 6	88 0	320 6	170 5
Wurttemberg	(k)	19,507 3	7,531 8	2,437,574	2,302,179	5 9	34 0	125 0	93 2
Baden	(g)	15,070 3	5,818 6	2,142,833	2,010,728	6 6	46 6	142 2	96 9
Hesse	(g)	7,688 4	2,969 5	1,282,051	1,209,175	6 0	50 3	166 8	111 0
Mecklenburg-Schwerin	(g)	13,126 9	5,068 3	639,958	625,045	2 4	14 7	48 8	42 5
Saxe-Weimar	(g)	3,610 0	1,393 8	417,149	388,095	7 5	45 8	115 6	79 2
Mecklenburg-Strelitz	(g)	2,929 5	1,131 1	106,442	103,451	2 9	9 8	36 3	33 1
Oldenburg	(g)	6,429 1	2,482 3	483,042	438,856	10 1	52 6	75 1	49 3
Brunswick	(d)	3,672 0	1,417 8	494,339	485,958	1 7	58 6	134 6	84 5
Saxe-Meiningen	(d)	2,468 3	952 8	278,762	268,916	3 7	48 3	112 9	76 2
Saxe-Altenburg	(d)	1,323 5	511 0	216,128	206,508	4 7	52 1	163 3	107 4
Saxe-Coburg-Gotha	(d)	1,976 8	763 2	257,177	242,432	6 1	47 5	130 1	89 0
Anhalt	(d)	2,299 4	887 8	331,128	328,029	9	62 8	144 0	88 7
Schwartzburg-Sondershausen	(p)	862 2	332 9	89,917	85,152	5 6	33 8	104 3	77 9
Schwartzburg-Rudolstadt	(p)	941 0	363 0	100,702	96,835	4 0	33 3	107 0	80 3
Waldeck	(p)	1,121 0	432 8	61,707	59,127	4 4	9 8	55 0	50 2
Reuss Elder Line	(p)	316 3	122 1	72,769	70,603	3 1	61 4	230 1	142 5
Reuss Younger Line	(p)	826 7	319 2	152,752	144,584	5 6	71 6	184 8	107 8
Schaumburg-Lippe	(p)	340 3	131 4	46,652	44,992	3 7	45 5	137 1	93 9
Lippe	(p)	1,215 2	469 4	150,937	145,577	3 7	35 8	124 2	91 5
Lubeck	(fc)	297 7	114 9	116,599	105,857	10 1	123 5	391 7	175 2
Bremen	(fc)	256 4	99 0	299,526	263,440	13 7	144 7	1,168 2	476 8
Hamburg	(fc)	414 5	160 0	1,014,664	875,149	15.9	199 3	2,447.6	816 8
Alsace-Lorraine	(r)	14,521 8	5,606 9	1,874,014	1,814,564	3 3	20 9	129 0	106 8
German Empire		540,857 6	208,825 2	64,925,993	60,641,489	7 1	58 1	120 0	75 9

Urban and Rural Population—The increase in Germany's population is largely urban. The population in 1910 (64,925,993) was divided among 75,939 communes (Gemeinden) Communes with less than 2000 inhabitants are regarded as rural; these numbered 72,199, with

25,945,587 inhabitants Communes with less than 100 inhabitants numbered 15,013, with a population of 822,406, communes with 100 to 499 inhabitants, 40,516, with a population of 10,250,420, communes with 500 to 999 inhabitants, 11,686, with a population of 8,090,857, communes with 1000 to 1999 inhabitants, 4984, with a population of 6,790,904 The urban communes, i e, those having 2000 or more inhabitants, numbered, in 1910, 3740, with a population of 38,971,406 Communes with 2000 to 4999 inhabitants numbered 2441, with a population of 7,297,770, communes with 5000 to 19,999 inhabitants, 1028, with a population of 9,172,333, communes with 20,000 and less than 100,000, 223, with a population of 8,677,955, communes with more than 100,000, 48, with a population of 13,823,348 The number of communes in the several groups and their percentage of population on total population are shown below for various dates since the foundation of the Empire

	YEAR	Number of communes	Percentage on total pop
Communes with a population of 2000 to 4999	1871	1,716	12 4
	1890	1,997	12 0
	1900	2,269	12 1
	1910	2,441	11 2
Communes with a population of 5000 to 19,999	1871	529	11 2
	1890	733	13 1
	1900	864	13 5
	1910	1,028	14 1
Communes with a population of 20,000 to 99,999	1871	75	7 7
	1890	135	9 8
	1900	194	12 6
	1910	223	13 4
Communes with a population of more than 100,000	1871	8	4 8
	1890	26	12 1
	1900	33	16 2
	1910	48	21 3
Total, urban population	1871	2,328	36 1
	1890	2,891	47 0
	1900	3,360	54 3
	1910	3,740	60 0
Communes with a population of less than 2000, rural population	1871		63 9
	1890		53 0
	1900	73,599	45 6
	1910	72,199	40 0

The figures show a remarkable decline in the percentage of rural population Thus, while in 1871 the population of communes having 2000 or more inhabitants was 36 1 per cent of the total and that of communes having less than 2000 inhabitants was 63 9 per cent, the urban population in 1910 was 60 per cent and the rural 40 per cent Communal population of the larger German cities, according to the 1910 census Berlin, 2,071,257 (Greater Berlin, 3,710,000), Hamburg, 932,116, Leipzig, 626,267, Munich, 607,592; Dresden, 551,697, Cologne, 516,527, Breslau, 514,765, Frankfort-on-the-Main, 414,576, Düsseldorf, 358,728, Nuremberg, 333,142, Charlottenburg, 305,978, Hanover, 302,375, Essen, 294,653, Chemnitz, 287,807, Stuttgart, 286,218; Magdeburg, 279,629, Bremen, 247,437, Konigsberg, 245,994, Stettin, 237,419, Neukolln (formerly Rixdorf), 237,289, Duisburg, 229,483, Dortmund, 214,226; Kiel, 211,627, Mannheim, 206,049, Halle 180,843, Strassburg, 178,891, Berlin-Schoneberg, 172,823, Altona, 172,628, Danzig, 170,337, Elberfeld, 170,195, Gelsenkirchen, 169,513; Barmen, 169,214, Posen, 156,691, Aachen (Aix-la-Chapelle), 156,143, Cassel, 153,196, Brunswick, 143,552, Bochum, 136,931, Karlsruhe, 134,313, Lichtenberg, 133,141, Krefeld, 129,406, Erfurt, 123,548, Plauen, 121,272

Sex and Conjugal Condition—In Germany, as in most other countries not newly settled, the number of females exceeds that of males In 1910, males numbered 32,040,166, and females 32,885,827, or 97 4 males to each 100 females, there are born about 106 boys to each 100 girls, but the number of females is in excess on account of the greater mortality and emigration among males In 1910 unmarried males numbered 19,516,340, and females 18,591,604, married, 11,608,028 and 11,621,685, divorced, 49,122 and 88,666 In 1910 and 1911 respectively marriages numbered 496,396 and 512,819, births (including stillbirths), 1,982,836 and 1,927,039, deaths (including stillbirths), 1,103,723 and 1,187,094, excess of births, 879,113 and 739,945 living births, 1,924,778 and 1,870,720 The following table shows, for various periods and years, for each 1000 inhabitants *m* the number of marriages, *b* births (including stillbirths), *d* deaths (including stillbirths), *e* excess of births over deaths, *l* living births, and for each 100 births *i* the number of illegitimate births, *s* the number of stillbirths

YEARS	*m*	*b*	*d*	*e*	*l*	*i*	*s*
1851–60	7 8	36 8	27 8	9 0	35 3	11 5	4 0
1861–70	8 5	38 8	28 4	10 3	37 2	11 5	4 1
1871–80	8 6	40 7	28 8	11 9	39 1	8 9	4 0
1881–90	7 8	38 2	26 5	11 7	36 8	9 3	3 7
1891–1900	8 2	37 3	23 5	13 9	36 1	9 1	3 2
1905	8 1	34 0	20 8	13 2	33 0	8 5	3 0
1907	8 1	33 2	19 0	14 2	32 3	8 7	3 0
1909	7 8	32 0	18 1	13 9	31 0	9 0	2 9
1910	7 7	30 7	17 1	13 6	29 8	9 1	2 9
1901–1910	8 0	33 9	19 7	14 3	32 9	8 6	2 0
1911	7 8	29 5	18 2	11 3	28 6	9 2	3 0

Although the average annual increase of population in 1901–10 (1 41 per cent) was greater than in the preceding decade (1 31), and although the death rate declined from 21 8 in 1901 to 17 1 in 1910, the rate of population increase in Germany appears no longer to be advancing The movement in the death rate (and in the stillbirth rate) is similar to that of other countries where modern medical science is widely applied The movement in the birth rate reflects a condition normal in a population tending rapidly cityward Also, in a civilized community the birth rate shows, within certain limits, an inverse relation to the diffusion of artificial refinements The falling birth rate, long conspicuous in France, has been, since about the beginning of the present century, very noticeable in Germany

Emigration Germany was long notable for her large number of emigrants During the eighteenth century and the early part of the nineteenth Russia attracted many German emigrants, granting them various privileges, land, and pecuniary aid During the latter century, it is estimated, more than 6,000,000 people left Germany, the majority of them for the United States The largest emigration was in 1881, 220,902, in 1912 German emigrants numbered only 18,545 Since 1897 there has not been much fluctuation in the numbers of persons leaving the country The total number of emigrants, the rate of emigration per thousand of the

population, and number of emigrants to the United States have been as follows

YEAR	Total No	Rate	To United States
1881	220,902	4 86	206,189
1891	120,089	2 41	113,046
1893	87,677	1 73	78,249
1895	37,498	72	32,503
1900	22,309	40	19,703
1905	28,075	47	26,005
1908	19,883	32	17,951
1910	25,531	39	22,773
1911	22,690	35	18,900
1912	18,545	28	13,706

Religion At the 1900 census, Evangelicals comprised about 62 5 per cent of the population, and Roman Catholics 36 1 per cent, in 1910, 61 6 and 36 7 The proportionate distribution of these bodies, which has changed but little since the religious wars of the seventeenth century, is characterized by a decided grouping within certain definite limits, corresponding to the states or to smaller political divisions, so that in most localities one or the other sect is strongly predominant Some changes in the relative proportions of the two sects has taken place in the large cities as a result of the movement of population accompanying their recent growth In general, central Germany is the stronghold of Evangelicalism and the Rhine and Danube regions of Roman Catholicism More than one-third of the population of Prussia consists of Roman Catholics, who are especially numerous in Posen, Silesia, West Prussia, Westphalia, and the Rhine Province The following table shows the religious distribution of the people according to the census of Dec 1, 1910

STATES	CHRISTIANS			Jews	Others	PER CENT			
	Evangelicals	Roman Catholics	Others			Evangelicals	Roman Catholics	Other Christians	Jews
Prussia	24,830,547	14,581,829	189,887	415,926	147,030	61 82	36 31	0 47	1 04
Bavaria	1,942,658	4,863,251	13,963	55,065	12,354	28 21	70 61	0 20	0 80
Saxony	4,520,835	236,052	25,574	17,587	6,613	94 05	4 91	0 53	0 37
Württemberg	1,671,183	739,995	12,863	11,982	1,551	68 56	30 36	0 53	0 49
Baden	826,364	1,271,015	13,229	25,896	6,329	38 56	59 32	0.62	1 21
Hesse	848,004	397,549	6,707	24,063	5,728	66 15	31 01	0 52	1 88
Mecklenburg-Schwerin	615,511	21,043	1,289	1,413	702	96 18	3 29	0 20	0 22
Saxe-Weimar	393,774	19,980	841	1,323	1,231	94 40	4 79	0 20	0 32
Mecklenburg-Strelitz	101,513	4,255	352	254	68	95 37	4 00	0 30	0 24
Oldenburg	371,650	107,508	1,591	1,525	768	76 94	22 26	0 33	0 32
Brunswick	464,175	25,888	1,774	1,757	745	93 90	5 24	0 36	0 36
Saxe-Meiningen	271,433	5,233	610	1,137	349	97.37	1 88	0 22	0 41
Saxe-Altenburg	207,825	7,246	481	194	382	96 16	3 35	0 22	0 09
Saxe-Coburg-Gotha	250,454	4,951	319	783	670	97 39	1 93	0 12	0 30
Anhalt	315,262	12,755	1,087	1,383	641	95 21	3 85	0 33	0 42
Schwarzburg-Sondershausen	87,836	1,732	57	215	77	97 69	1 93	0 06	0 24
Schwarzburg-Rudolstadt	99,210	1,288	88	78	38	98 52	1 28	0 08	0 08
Waldeck	57,857	2,858	393	590	49	93 69	4 63	0 64	0 96
Reuss Elder Line	70,489	1,296	866	44	74	96 87	1 78	1 19	0 06
Reuss Younger Line	147,272	3,498	779	375	828	96 41	2 29	0 51	0 25
Schaumburg-Lippe	44,385	715	1,314	230	8	95 14	1 53	2 82	0 49
Lippe	143,961	5,936	193	780	67	95 38	3 93	0 13	0.52
Lübeck	111,543	3,968	276	623	189	95 66	3 40	0 24	0 54
Bremen	259,688	22,233	1,290	1,843	14,472	86 70	7 42	0 43	0 62
Hamburg	929,758	51,036	4,255	19,472	10.143	91 63	5 03	0 42	1 92
Alsace-Lorraine	408,274	1,428,343	3,868	30,483	3,046	21 78	76 22	0.21	1 63
German Empire	39,991 421	23,821,453	283,946	615,021	214,152	61 59	36 69	0 44	0 95

The Evangelical church in Germany contrasts with the Protestant church in America and England in that it is not split up into numerous rival factions The adherents of the church are divided between the two confessions, the Lutheran and the Reformed, and the United Evangelical church (dating from 1817 and at first established only in Prussia), formed by a union of the Lutheran and Reformed bodies under state auspices The largest Evangelical denomination outside of the Lutheran and Reformed bodies, that of the Baptists, numbers only about 30,000 members By its latitudinarianism the Evangelical church has retained within its fold the followers of many widely different schools of thought, from extreme orthodoxy to rationalism At the end of the nineteenth century the tendency towards rationalism in theology, which had long been so prominent in Germany, was apparently on the decline In the last quarter of the century a considerable element of the laboring class in the large centres of population had become divorced from any church through the rise of the socialistic propaganda, the defection varying in intensity from passive indifference, growing out of the belief that the church was in league with the existing political order, to a radical opposition to all religion The Evangelical body has suffered much more severely from this movement than has the Roman Catholic, the priesthood of the latter organization having been largely successful in checking the movement through their activity in establishing Roman Catholic organizations for laboring men The seceders from the Roman Catholic church after the Vatican Council of 1870 assumed the name of Old Catholics, and this faction now numbers about 50,000 The Roman Catholics have concentrated their forces until they have become politically the strongest party in the Empire and have consequently obtained certain advantageous concessions The severe Prussian laws of 1873 directed against ultramontanism, by attempting especially to limit and to control Roman Catholic education, were repealed in 1887, and religious congregations—the Jesuits excepted—existing for charitable or contemplative purposes are allowed The different branches of the Christian

faith are subsidized by the individual states, and in some the Jews also receive support See REFORMATION.

Education From almost the beginning of modern times Germany has held the primacy in educational rank It has been distinguished both for the general diffusion of knowledge and for the superiority of its specialists in the various fields of learning Many of the names most prominent in the pedagogical world are German As early as 1642 Weimar had enacted a compulsory educational law, and before the middle of the century other places in Germany had followed the example At present every child in the empire must attend school every school day in the year (usually about 42 weeks) for a period which in most German states extends from the ages of 6 to 14 years The law is enforced to the letter, and there are scarcely any evasions As a consequence, illiteracy has been practically eliminated

The early movement for the improvement and extension of education was the result largely of the efforts of the Church, which had almost exclusive charge of educational matters. The first systematic educational effort dates back to the Carlovingian schools attached to monasteries and cathedrals Their methods prevailed with some modifications through the Middle Ages By the end of the fifteenth century common schools were widespread in Germany The ecclesiastical conflicts of the sixteenth century checked for the time educational progress, which was successfully resumed after the cessation of the religious wars. Frederick William I of Prussia established at his own expense 400 schools for the common people, and his son, Frederick the Great, was very active in furthering educational interests For the regulation of schools he promulgated in 1763 an order that is considered the basis of the present German system This order fixed a period for compulsory attendance, supplemented school support from the state funds, and provided for the superintendence of schools and regulations for the selection of teachers A Law of 1794 held that all public schools and educational institutions were under the care of the state, at the same time recognizing religious instruction under the proviso that children trained in one religious faith could not be forced to take instruction in another The educational system was revised in 1854 and again in 1872 The interest so early manifested has never been relaxed It was estimated as early as 1840 that the pupils of Prussia numbered one-sixth of the population.

Germany has been free from the bitter religious wrangles that have characterized the educational history of France and of the United Kingdom, for it was agreed almost without question in Germany that there should be religious teaching. Schools are provided for Catholics, Protestants, and Hebrews separately, with teachers of the respective faiths, or, if conditions do not justify the establishment of separate schools, special arrangements are made separately and at the state's expense for instruction on the subject of religion With the growth of state aid and the centralization of the school system, ecclesiastical authority has been greatly lessened, but a large per cent of the school inspectors are still the local pastors. Ecclesiastical authorities inspect the religious instruction given in the secondary schools, but their rôle is only advisory.

The educational scheme in Germany is made to conform closely to the existing social order and is strikingly different in arrangement from the American The classification resulting from the recognition of religious differences has already been noted, but of still greater moment are the differences due to the distinction made between the sexes and to the recognition of social classes There are, therefore, decided differentiations between schools and a disregard of coordination as the term is commonly understood in America The line of demarcation between primary and secondary education in Germany is thoroughly well defined. It is a longitudinal differentiation established on a basis of class distinction and ultimate destination of the individual—in the last analysis determined purely by the financial standing of the parents—rather than a latitudinal differentiation, based upon age of pupils and subjects of instruction, with practical democratic ideas as a foundation, wherein lack of financial ability constitutes no insuperable barrier to the realization of individual ambition In Germany primary and secondary schools exist side by side, the former being free schools and the latter fee schools, although for the first three years the subjects of instruction are exactly the same in both If the financial status of the family warrants the youth in aspiring to become a member of the directing class in any field of endeavor, the decision must practically be made by the ninth year of the child's life, or the third year of the school, at the time when the secondary school proper begins. Once beyond this point, transition to the secondary school becomes practically impossible, and the elementary-school pupil is thenceforth destined to be a private, or at best an under officer in the great vocational armies, he is cut off forever from rising to a commanding position The schools which admit to the greatest honors are thus protected by their greater cost and are therefore entirely beyond the reach of the humbler classes

Primary Education—The schools usually referred to as primary are known as the Volksschulen, which provide for the ordinary period of compulsory attendance Fees were formerly charged in the primary schools, as late as 1901, 0 3 per cent of the total income of these schools being derived from this source, but to-day, save for extremely rare instances, all this instruction is free. Aside from the opportunity of transition at the end of the third or fourth year, the course here does not coordinate with the courses in the higher schools which lead to social preferment, and practically none of the pupils who complete it take up the work in the secondary schools The only further educational provision for these children—except the few selected for normal students—are the Fortbildungsschulen, or continuation schools (part-time schools for the youth of one or both sexes, following the close of the elementary school course, and ordinarily covering the period from 14 to 17 years of age), and certain other vocational classes The children who attend the Volksschulen are largely from the lower masses Parallel with the Volksschulen, and doing exactly the same type of work, are the Vorschulen, or preparatory classes, attached to the regular secondary schools By no means every secondary school has its preparatory classes, but where found they operate on a basis of class distinc-

tion and serve to separate the children of the classes from those of the masses even from the very first years of school It is perhaps unnecessary to suggest that the Vorschulen are fee schools The state supports no kindergarten schools They are maintained through private agencies and are sometimes aided by the municipality

Secondary Education—The secondary system is built up with little regard to the primary system It takes its form solely with regard to the career for which it is intended to prepare, the selection forced upon parents at the end of the third year of the child's school life determining to a very large extent the ultimate career of their offspring In the secondary-school system of earlier centuries the ancient classics held a dominant position, and an extensive system of privileges admitting to social rank had been based upon them and tended to give them a peculiar persistence The schools in which the classics still constitute the central feature of the course are called the Gymnasien, and it is only by taking this course that admission may be secured to many of the highest government positions or the highest social recognition reached. But the requirements of a practical age have demanded greater and greater concessions Changing conditions of modern society brought about a reaction against the exclusive classical basis of secondary-school culture As early as the middle of the eighteenth century nonclassical schools (Realschulen), wherein modern languages, mathematics, and science formed the backbone of the course, began to come to the front For 100 years they made slight headway, and it was not until the last half of the century just closed that these "modern" schools became relatively free for a greater development First arose a differentiation of type, with one school teaching Latin and the other eschewing the classics altogether In 1882 these two innovations assumed a more decided form, and since that time there have been three well-defined lines of development in boys' secondary education—the ultraclassical, represented by the Gymnasium, which offers both Latin and Greek, the semiclassical, represented by the Realgymnasium, with Latin but no Greek, and the exclusively modern, represented by the Oberrealschule, wherein the classical influence is entirely lacking, and in its place one finds the more realistic subjects—living languages, science, and mathematics—occupying the dominant place The Gymnasium emphasizes purely humanistic culture, the Oberrealschule stands for exclusively "modern" studies, expressed by the very convenient German term "Realien", while the Realgymnasium is a hybrid, occupying the middle ground between the two extremes of ultrahumanism and ultrarealism Even under such hard and fast conditions as those prevailing in Germany, definite choice of a boy's life career as early as nine years of age is exceedingly difficult The so-called "Frankfort plan," introduced in 1892, was devised to meet the situation This is simply a combination of the Gymnasium and Realgymnasium courses in the same school, wherein the work of the first three years of the secondary school proper is common Thus, the family is not compelled to choose between the two courses until the boy's twelfth year, or as late as the sixth year of school. A recent modification practically makes it possible to postpone the decision until two years later, provided the boy is willing to do a little extra work in either Latin or French, according to the new course selected So popular has been this device to avoid too early specialization that more than a quarter of all the Gymnasien and Realgymnasien in Prussia are now organized on this basis

Each of the three types of nine-year secondary schools has a short-course counterpart, six years in length—the Gymnasium having its Progymnasium, the Realgymnasium, its Realprogymnasium, and the Oberrealschule, its Realschule This makes possible the extension of secondary education to communities which are not in position to support a full-course school. These six types of schools—Gymnasium, Realgymnasium, Oberrealschule, Progymnasium, Realprogymnasium, and Realschule—constitute what are known as "higher" schools, whose chief distinguishing characteristic is that the pupils are eligible for the one-year volunteer service privilege in the army Completion of six years' work in a recognized secondary school, or passage of a special examination in the case of pupils of the non-recognized secondary schools, brings the coveted honor Such is the social prestige attached to this privilege that parents willingly make the financial sacrifice imposed upon the volunteer of paying his entire expenses while in the army—board, lodging, clothing, and equipment—a not inconsiderable figure in the cavalry arm of the service

Under the reform of 1901 the former dominance of the classics has been largely broken down, for now the three types of schools are theoretically upon an equality The elaborate system of privileges previously reserved exclusively for the graduates of the Gymnasium has now been thrown open to the graduates of the other two types of secondary schools, i e, the Realgymnasium and the Oberrealschule Formerly free entrance to the university courses was restricted to the Gymnasium pupils Now, in Prussia, graduates of all three schools are on practically equal footing, as far as competition for the various privileges is concerned. For the study of theology, however, the Gymnasium course is still exclusively required Oberrealschulen graduates are also debarred from studying medicine, unless they choose to make up the required Latin by outside study No one of the other German states is quite so liberal as Prussia The relative importance of the different classes of secondary schools in Germany is seen in a statement of their number In 1911, the numbers of boys' secondary schools, public and private, were as follows 524 Gymnasien and 81 Progymnasien, 223 Realgymnasien and 63 Realprogymnasien, 411 Realschulen and 167 Oberrealschulen, and 218 "other" secondary schools (i.e, with less than the full nine-year course), almost entirely confined to the south German states. The school population was Gymnasien, 160,237, Realgymnasien, 70,357, Oberrealschulen, 75,832, Progymnasien, 9509, Realprogymnasien, 7252, and Realschulen, 89,968

As in other continental countries, the secondary education of girls has lagged considerably behind that of boys Thanks to the constant agitation of a group of faithful women struggling for the emancipation of their sex, the reform of 1909 placed girls' secondary schools upon a much more satisfactory basis, although the government is still loth to expend money on such an apparent luxury, for nearly half of the

girls' secondary schools in all Germany were in 1911 under private control State regulations are issued for their administration, however, just as in the case of the boys' schools Secondary education for girls in Prussia is provided in three types of institutions Lyzeum, a 10-year course from 6 to 16, Oberlyzeum, with a two-year women's school course and a four-year normal school course, and university preparatory school (Studienanstalt), with a six-year course in the Gymnasium and Realgymnasium divisions and a five-year course in the Oberrealschule division, all three substantially paralleling the corresponding types among the boys' schools Girls leave the Lyzeum at the close of the seventh year of the course to enter the Gymnasium or the Realgymnasium division, and one year later to enter the Oberrealschule division Although girls are thus admitted freely to the universities, the final decision as to whether or not they will be admitted to a particular university class rests with the professor in charge

Universities—Germany has 21 universities, the largest being Berlin, with 9806 pupils (winter semester, 1912–13), Munich, 6759, and Leipzig, 5351 (these figures do not include non-matriculated students) The other universities are as follows· Bonn, Breslau, Freiburg, Halle, Tubingen, Heidelberg, Gottingen, Marburg, Strassburg, Wurzburg, Kiel, Konigsberg, Erlangen, Giessen, Greifswald, Munster, Jena, Rostock All legal formalities have been completed which provide for opening the University of Frankfort on the Main in October, 1914 The universities of Freiburg, Munich, Munster, and Wurzburg have Roman Catholic faculties of theology, Bonn, Breslau, Strassburg, and Tubingen have mixed Catholic and Protestant faculties, and the other universities are all Protestant. University students are allowed an extreme degree of liberty, in striking contrast to the rigid discipline observed in the secondary schools Indeed, the spirit of freedom pervading the university life, as evidenced especially in the great liberty enjoyed by the university faculties in thought and speech, is apparently an anomaly in a government so strongly military. Further reflection, however, will show that preservation of monarchical ideals is sufficiently safeguarded by the control exercised by the Minister of Education over the appointment of university professors Usually he designates one of the three candidates presented by the university senate, but it is quite within his power totally to disregard these suggestions and to select a candidate of his own choice. Persons holding dangerous views in any field are thus effectually eliminated The universities are of equal rank and the entrance requirements are the same, viz, the completion of the course at a nine-year secondary school While the universities are in theory nonrespecters of persons of social classes, they are in reality exclusive, because the expense of university life and of the secondary course preceding it tends to limit the attendance to representatives of the higher social classes.

Technical and Vocational Education—Just as the ordinary schools are classified in three large groups or degrees, so the vocational schools, most of which are under the Minister of Commerce and Industry, all fall into one of three levels—lower, middle, and higher. Under this ministry the lowest group includes the continuation schools, industrial and commercial, the middle group, the middle technical and trade schools on the one hand and the secondary commercial schools on the other, the higher group, the colleges of commerce Largely from historical reasons, the highest of the technical group, the technical colleges, still remain under the direction of the Minister of Education, while he likewise controls some of the secondary commercial schools as well In addition there are schools of agriculture, forestry, brewing, and the like, so that opportunity is offered for vocational training along practically every line The lowest or continuation schools (Fortbildungsschulen) are part-time schools (compulsory in 12 of the 26 states of the Empire) for young people from 13 or 14 to 16 or 18 years of age, who have completed the elementary school and *are already at work* They hold the youngster from four to eight hours per week (the number varying in the different states of the Empire, and the time most frequently taken from the working day), and they aim to give him simple theoretical training that shall have a direct bearing upon his occupation, but that is not designed to lift him above the position of an ordinary artisan or workman In this same category are found the so-called mechanics' schools (Handwerkerschulen) with their out-of-work-hours classes for the improvement of journeymen These latter schools are largely maintained by guilds and corporations The middle technical and trade schools are of various types—engineering schools, building-construction schools, textile schools, schools for artistic trades, and simple trade schools for woodworkers, glassworkers, photographers, and the like This group is by far the most diversified and the most difficult to classify They differ from the schools of the lower group in that all require some practical work *already completed*, whereas the lower schools admit pupils who are carrying on their trade *pari passu* The courses vary in length from one to three years, and the age limits range ordinarily from 18 to 25 years and over They aim to give a kind of middle and lower training for engineers and to turn out jobmasters, second hands, and the like Secondary commercial schools provide a kind of middle commercial training and in some cases offer courses which satisfy the requirements of the one-year volunteer certificate. The third or higher group consists of the technical colleges and the colleges of commerce They furnish the highest type of industrial or commercial training, open the way to the highest state and private careers, and prepare the future leaders in the general fields of industry and commerce The technical colleges are the real scientific schools of Germany, corresponding to the Massachusetts Institute of Technology and similar institutions in America Each of these higher technical schools or technical colleges specializes in one or more of the technical professions—civil, electrical, marine, and mechanical engineering, architecture, forestry, metallurgy and mining, navigation, shipbuilding, chemistry, pharmacy, and general science Several of these fields are treated in more elementary fashion in the schools of the middle group The initiative for, as well as the actual work connected with, the foundation of the major part of the trade schools of Germany has come from the various trade organizations, industrial associations, or the government of the community concerned.

Some of them owe their inception to purely private beneficence Even in the case of the ordinary continuation schools, semipublic organizations have frequently taken the initiative, and the schools have been taken over by the community subsequently, after the pioneer work has already been done The interest of the German industrial in effecting trade-school work has not been evanescent, but it has served to keep him in close personal contact with its progress He has not been concerned with vocational work in general, but with training for his specific business The result has been that the schools always reflect the particular activity of the community or at least of the immediate region Mining areas have mining schools, textile centres have textile schools, shipping localities have schools which tend to develop the maritime industries This cooperation between school and industry, which is common alike to commercial and industrial schools, is one of the strongest and most helpful features of the German vocational-school movement Berlin is the largest of the technical colleges, having had 2851 students (winter semester, 1912–13), but it is closely followed by Munich, with 2766 The total enrollment at the 11 colleges (Aachen, Berlin, Breslau, Brunswick, Danzig, Darmstadt, Dresden, Hanover, Karlsruhe, Munich, and Stuttgart) was 16,418 Among the colleges of commerce Cologne occupies the first place with 2542 students (winter semester, 1912–13), of whom only 555 were matriculated students The total number of matriculated students at the six colleges (Berlin, Cologne, Frankfort, Leipzig, Mannheim, and Munich) was 2851, although 7637 represents the total number profiting by the instruction of these schools

School Administration—The German states act independently in their school systems The main important outlines of the respective systems are nevertheless almost uniform There is much variation in details The Prussian system is generally described as representative The control of the Prussian schools is through the Department of Education, subject to the limitations of the constitution and of precedent The head of the department is a cabinet officer, known as the Minister of Religious and Educational Affairs The Minister is aided by a large number of special councilors There are two divisions for education in the department, the first having charge mainly of the universities and the secondary schools, the second of elementary education and the training of teachers. In each province there is a school board, of which the president of the province is chairman The other members are proposed by the Minister of Education and appointed by the King This board supervises the most general matters, such as questions concerning textbooks, etc, and especially matters concerning the secondary schools The provinces are divided into administrative counties (Regierungen), and these again into districts, both the large and small divisions having school boards These county school boards concern themselves more particularly with the common schools, although their control is decidedly general in its nature, being responsible for the execution of all school laws and of all regulations that come down from the higher authorities Below these county boards are the local authorities—the municipal school deputation in towns and cities, and the school committee in the rural districts The municipal deputation may, and usually does, delegate a portion of its authority to a smaller body called the school commission, a group of individuals having charge of a single school The municipal deputation is quite comparable to the American school board, save that it deals with the purely external affairs of the schools and their maintenance, having no control over the teachers in their professional capacity nor over the methods and processes of instruction Such internal affairs of the school are under the absolute domination of the central authorities

Teachers—No country is as particular as Germany in the selection and preparation of teachers The teacher is an officer of the state and enjoys a prominent social rank He is sure of his position for life or, after a period of service, of retirement upon a pension However, honor is an important part of his compensation, for, especially in the primary schools, the salary is meagre and occasions much complaint The qualifications required of teachers are about uniform in the different states, and each recognizes the certificates granted by the others The process of selecting candidates for primary teaching begins with the children in the primary schools, only the most promising pupils being selected On leaving the primary school the child takes a three-year course, especially designed for preparation for the normal school (seminary), where one year more of academic work and three years of normal work are demanded, the student, if needy, being financially assisted by the state By limiting the number of preparatory schools the state can prevent the creation of any serious overplus of teachers The feature of religious devotion is prominent in the seminaries—these being either Protestant or Roman Catholic After finishing the seminary the candidate receives a provisional appointment and is only permanently accepted after demonstrating fitness and passing a final examination No country in the world sets such a high standard as Germany for the qualifications of the secondary teacher He must be a graduate of a nine-year secondary school, with at least three years of university study, one year of preparation for the state examination, one year of pedagogical study (Seminarjahr), and finally a year of successful practice-teaching experience Even after having done this, and having passed all the examinations required, he is only eligible for appointment Once on the list of the provincial school board, he is practically sure of a position, although he sometimes has to wait several years before the opportunity arrives This all results in a degree of academic and professional preparation which is absolutely unknown in England or America

School Funds—The method of the development of the school system has resulted in a complicated and diversified system of financial support There are generally local taxes, which if necessary are supplemented by the state The state fund is the largest source, supplying about one-half of the expenses, while local taxation supplies about one-fourth The Church and Church societies are often important contributors.

Charities. The different German states, except Bavaria and Alsace-Lorraine, have adopted uniform systems of poor laws, but there is no centralized system of administration Each poor-law district provides for its own poor, a residence of two years being the requisite time

to determine the place of settlement, although relief may be given by the local authorities of the district in which the individual has temporary residence, to be recovered from the community in which the settlement of the individual is fixed The distinction between public and private charity is not closely drawn

Compulsory Insurance. The Empire has played a very important part in providing for the welfare of the masses and thus checking the possibility of destitution, through the establishment of compulsory insurance against accident, sickness, and old age None of the other leading nations has made provisions of so comprehensive a nature for the benefit of the laboring classes Insurance against sickness, the first step taken, was first secured in 1883, followed in 1884 by the insurance against accident and in 1889 against old age Numerous benefit societies conducting insurance features, already in existence, were recognized by the government and allowed to act as agents in lieu of those appointed by the state, which subjected all such organizations to a uniform system and control The division of administration necessitates an increased expenditure, and an attempt has been made to centralize the entire administration of the system in the hands of the state In the insurance against sickness two-thirds of the premium is contributed by the workmen and one-third by the employer In the insurance against accident the employer class is responsible for the burden of contribution but the relief to the injured laboring man is taken from the sick fund for the first 13 weeks, and it is only after the expiration of that period that the employer class becomes liable Insurance against old age is obligatory upon all laborers whose wages do not exceed 2000 marks a year The premium paid is divided evenly between laborer and employer. The receipt of the pension begins when the insured reaches the age of 70. The amount expended in compensation in various forms under these insurance systems in 1910 was, in round figures sick insurance, $100,000,000; accident insurance, $50,000,000, invalidity and old age, $62,000,000 The pensions paid are in proportion to the wages received by the pensioner and in case of invalidity and old age range from $40 to $90 per annum in case of disability or reaching the age of 70 The sums paid in the accident insurance system are also based on earnings and in case of the death of the insured are paid to his widow and children at rates proportional to his earnings when employed

History. The history of Germany may be said to begin with the year 843, when, by the Treaty of Verdun, the vast Empire of Charles the Great was divided into three parts among his grandsons (For the earlier periods, see GERMANIA, FRANKS, CHARLES THE GREAT, CAROLINGIANS, ETC) In the partition of Verdun, Louis the German (843–876) received the eastern portion of the Frankish Empire, which included the purely Germanic peoples Until 911 legitimate or illegitimate Carolingians held the throne, but their power was comparatively little and depended almost wholly on their strength in their own possessions Instead of a united Germany there were several great German duchies —Swabia, Bavaria, Franconia, Saxony, and sometimes Lotharingia or Lorraine The last, however, was debatable territory, independent at first, it later was connected with its stronger neighbor, Germany or France, as the case might be At first the Franconians and Saxons were the strongest nations and supplied the rulers of the German Kingdom Charles the Fat (876–887), son of Louis the German, succeeded for a brief time (884–887) in reuniting almost all the old Frankish lands under his sway, but they fell apart again after his death, and part of Germany was ruled by Arnulf till 899 The last Carolingian King, Louis the Child, died in 911, and the German princes elected as his successor Conrad of Franconia (911–918) His reign was a constant struggle to maintain his position against his own nobles, while at the same time he had to contend against Danish, Slavic, and Hungarian invaders Just before his death he sent the insignia of royalty to his most dangerous subject, Henry the Saxon (919–936), and the latter was chosen King by the Franks and Saxons After years of fighting and negotiations Henry the Fowler (as he was popularly known) was recognized by the Swabians and Bavarians also Under him for the first time it is possible to speak of a united Germany He made his power respected by repulsing the invaders who had been devastating the eastern and northern portions of the German duchies The Slavs and Danes were defeated, Lorraine was conquered, and finally in 933, a great victory was won probably on the Unstrut, over the Hungarians His son Otho I (936–973) succeeded to a strong kingdom At the coronation banquet he was served by the dukes of Lorraine, Franconia, Swabia, and Bavaria Otho restricted the power of the dukes, checked renewed invasions of the Hungarians, defeating them decisively at the Lech in 955, and organized an efficient administrative system In 951 he was called to Italy to aid one of the contending factions there, in 961, after wresting north Italy from Berengar II, a descendant of Charles the Great, he was crowned King of the Lombards, and in 962 he received the Imperial crown at the hands of the Pope, thus becoming the founder of the Holy Roman Empire of the German nation, which existed till 1806 (See HOLY ROMAN EMPIRE) By his coronation Italy and Germany became associated for long centuries to come The results were in some ways disastrous to both countries, but at the time Otho, as Emperor, was the great power in western Europe In order to strengthen his position, he negotiated a marriage for his son with the daughter of the Byzantine Emperor Otho II (973–983) died at the age of 28 and left an heir of three, Otho III (983–1002) In consequence of the extent to which the Imperial power was enlisted in the affairs of Italy at this time, weakness and disunion were bred in Germany Henry II (1002–24) left Italy to itself for some years and devoted his reign to strengthening the power of the King of Germany He reformed the Church and employed its officials in the service of the state He repressed private wars and won the support of the nobles by giving them greater privileges He was the last King of the Saxon house

Conrad the Franconian, or Salian (1024–39), was an able ruler, who added the Arletan realm (see BURGUNDY) to the Empire His son and successor, Henry III (1039–56), extended the boundaries of Germany on the side of Hungary, repressed the insolence and despotism of the temporal and spiritual princes of Germany, and gained the respect of his contemporaries by his zeal for justice and his valor in the field. The

minority of his son and successor, Henry IV (1056–1106), enabled the nobles to recover much of their former power and to apply a check to the further consolidation of the Imperial authority, which had been considerably extended during the two preceding reigns Henry's constant quarrels with Pope Gregory VII and the succeeding popes entangled him in difficulties and mortifications which ended only with his life, and which plunged Germany into anarchy and disorder (See INVESTITURE) With his son and successor, Henry V (1106–25), the male line of the Franconian dynasty became extinct, and after the crown had been worn (1125–37) by Lothair of Saxony, Conrad III, Duke of Franconia, inaugurated the Hohenstaufen dynasty His reign (1138–52), in which the civil wars of the Guelphs and Ghibellines (q v) began, was distracted by the dissensions of the great feudatories of the Empire, while the strength of Germany was wasted in the disastrous Second Crusade, in which Conrad took an active part Frederick I (1152–90), surnamed Barbarossa, Duke of Swabia, was, at the recommendation of his uncle, Conrad, chosen his successor, and the splendor of his reign fully warranted the selection By the force of his character Frederick acquired an influence over the diets which had not been possessed by any of his immediate predecessors, and during his reign many important changes were effected in the mutual relations of the great duchies and principalities of Germany, while we now for the first time hear of the hereditary right possessed by certain princes to exercise the privilege of electing the Emperor (See ELECTORS, GERMAN IMPERIAL) Unfortunately for Germany, this great monarch suffered his desire to uphold the Imperial authority in Italy to draw him away from the interests of his own country, while his participation in the Crusades, in which he perished, was memorable only for the misfortunes which it entailed on the Empire The interval between the death of Frederick Barbarossa (1190) and the accession of Rudolph I (1273), the first Emperor of the Hapsburg line, was one of constant struggle, internal dissension, and foreign wars Individually the princes of the Hohenstaufen dynasty were popular monarchs, distinguished for their many noble and chivalrous qualities, while one of the race, Frederick II, was, after Charles the Great, perhaps the most remarkable sovereign of the Middle Ages, but their ambitious designs on Italy, and their constant but futile struggles with the papal power, were a source of misery to Germany The territory in which the Holy Roman emperors of the time of Hohenstaufen exercised their sway, or their overlordship, reached on the west to the rivers Rhone, Saône, Meuse, and Scheldt (thus embracing a large strip of modern France, Belgium, and the Netherlands), and extended on the east to the borders of Hungary and Poland, including most of what is now Cisleithan Austria On the north it extended as far as the Eider, and in the south nominal limits of the Empire reached down into Italy beyond Rome Henry VI (1190–97), son of Frederick Barbarossa, attempted to make the Imperial dignity hereditary in his family After his death Philip of Swabia (1198–1208) and Otho IV of Brunswick contended for the Imperial throne, the latter being recognized on the assassination of his rival by Otho of Wittelsbach With Frederick II (1215–50), the successor of Otho IV, ended the glory of the Empire, till it was partially revived by the house of Hapsburg Frederick's son, Conrad IV (1250–54), the last of the Hohenstaufen (q v), after a brief and troubled reign, was succeeded by various princes, who in turn, or in some cases contemporaneously (the Great Interregnum, so called), bore the Imperial title without exercising its legitimate functions or authority—William of Holland (1247–56), Alfonso the Wise of Castile (1257–62), Richard of Cornwall (1257–72) This season of anarchy was terminated at the accession of Rudolph I (1273–91), of the house of Hapsburg, who, by the destruction of the strongholds of the nobles and the stringent enforcement of the laws, restored order His chief efforts were, however, directed to the aggrandizement of his house In 1276 he vanquished Ottokar II of Bohemia and forced him to give up Austria, Styria, Carinthia, and Carniola Ottokar, having renewed the struggle, was defeated and slain on the Marchfeld in 1278 (See AUSTRIA-HUNGARY) For the next 200 years the history of the Holy Roman Empire presents very few features of interest and may be briefly passed over Adolphus of Nassau, who was elected to succeed Rudolph (1292), was attacked in 1298 by the son of the latter, Albert I of Austria, who coveted the Imperial throne, and the war speedily ended in the triumph of Albert The reign of this Prince (1298–1308) is chiefly memorable as the period in which the three Swiss cantons of Unterwalden, Schwyz, and Uri were achieving their independence, in 1309 they were recognized as immediate vassals of the Emperor After the murder of Albert the throne was occupied in rapid succession by Henry VII (1308–13), of the house of Luxemburg (whose dynasty ruled for a century in Bohemia), and by the rival emperors Frederick of Austria (1314–22) and Louis the Bavarian (1314–47) Charles IV (1347–78), the successor of Louis, of the house of Luxemburg, was the successful candidate among seven rivals Although he was engrossed by the interests of his hereditary possession of Bohemia, he did not entirely neglect those of the Empire, for which he provided by a written constitution known as the Golden Bull (q v), issued in 1356, which regulated the rights, privileges, and duties of the Imperial electors and the mode of election and coronation of the emperors The seven princes designated in the Golden Bull as Imperial electors were the archbishops of Mainz, Treves, and Cologne, the Duke of Saxony-Wittenberg, the Margrave of Brandenburg, the Count Palatine of the Rhine, and the King of Bohemia Charles's son Wenzel, or Wenceslas (1378–1400), who was finally deposed, brought the royal authority into contempt, from which it was scarcely redeemed by Rupert of the Palatinate (1400–10) The reign of Sigismund (1410–37), the brother of Wenceslas, is noteworthy in connection with the councils of Constance and Basel and the Hussite wars With Sigismund the Luxemburg line of emperors terminated In the person of Albert II of Austria (1438–39), the house of Hapsburg once more secured possession of the Imperial throne, which, with slight interruption, was occupied by them to the end, although the crown remained elective After a brief reign, in which he gave evidence of capacity for governing, Albert was succeeded by his cousin, Frederick III (1440–93), an accomplished but

avaricious and indolent prince, whose chief object seems to have been the aggrandizement of the house of Austria

Aspirations towards national unity had appeared before this among the people of Germany, but they ran counter to the spirit of feudal anarchy, and to the family policy of the Hapsburgs, who became by their marriage alliances more and more involved in general European affairs and less interested in those of Germany The emperors could not be made, therefore, the leaders of a national movement which sought rather to realize itself, first through the Diet, and then in alliance with the Lutheran Reformation (See REFORMATION) Upon this conflict, and upon the religious differences which grew out of the work of Martin Luther and John Calvin, the politics of the empire turned for 150 years. These tendencies developed under Maximilian I (1493–1519), during whose reign an active agitation was carried on in the Diet for reform (see AULIC COUNCIL, IMPERIAL CHAMBER), while Luther's bold challenge in 1517 set into play giant forces of change which were destined to shape German history for the future At the same time the marriages of Maximilian drew the Hapsburgs more than ever into interests outside of Germany The first of these marriages, with Mary, heiress of Charles the Bold of Burgundy (1477), added to the Hapsburg possessions the great Burgundian territories in the Low Countries, the second, with the daughter of Ludovico il Moro, Duke of Milan (1494), threw the Imperial house into the stormy politics of Italy The marriage of the son of the Emperor, the Archduke Philip, with Joanna of Spain made that country, then at the summit of its prosperity and power, likewise a Hapsburg possession in the person of Maximilian's grandson, Charles I of Spain, who was elected Emperor in 1519 as Charles V (1519–56). The energies of Charles were mainly directed to the prosecution of the war against France The Austrian possessions of the house of Hapsburg were bestowed on his brother Ferdinand (from whom the present German-Magyar-Slav monarchy of Austria-Hungary may be said to date), the control of affairs in Germany was left largely in the hands of the Imperial chambers, the pressing need for reform received little attention, and the spread of the Reformation was allowed to continue unchecked Luther, it is true, was placed under the ban of the Empire in 1521, but at Speier, in 1526, the Reformers gained a notable triumph, and it was not until the Diet of Augsburg, in 1530, that the Protestants and the Emperor came to an open breach. Danger from the French King and from the Turks, however, prevented Charles from taking action against the recusant princes, and for some 10 years after 1531 the Schmalkaldic League (q v) of Protestant princes exercised a preponderating influence in German affairs Only in 1546 did the Emperor find an opportunity for turning on the Protestants, the power of the Schmalkaldic League was broken in the battle of Muhlberg (1547), and the Protestant leaders, John Frederick, Elector of Saxony, and Philip, Landgrave of Hesse, were made prisoners Charles was now supreme in Germany, and it seemed for a moment as if he would succeed in winning back the Protestants into the Roman Catholic fold (See INTERIM, *Augsburg Interim*) But jealousy of his growing power caused Maurice of Saxony, Albert, Duke of Mecklenburg, the Margrave of Brandenburg, and William, the son of Philip of Hesse, to league against him in alliance with the French King, Henry II, who in 1552 wrested from the Empire the bishoprics of Metz, Toul, and Verdun The Treaty of Passau (q v), concluded in the same year, confirmed by the Peace of Augsburg in 1555, granted to the Lutheran states the right to establish the Protestant worship Broken by the uniform ill success of his policy, Charles laid down the government of the Netherlands in 1555, and in the following year abdicated the Spanish and Imperial thrones, being succeeded in the empire by his brother, Ferdinand I (1556–64) The reigns of Ferdinand and Maximilian II (1564–76) witnessed the very rapid growth of the Counter Reformation (q v) Profiting by the dissensions prevailing among the Protestants, Roman Catholicism, issuing in renewed vigor from the Council of Trent (1545–63), boldly challenged the progress of the Reformed religion Rudolph II (1576–1612) was under the influence of the Jesuits and lent himself to the aggressive policy of the Roman Catholic party In 1608 the Evangelical Union was organized under the leadership of the Elector Palatine, and this was followed by the foundation of the Roman Catholic League in the following year Matthias (1612–19) was less aggressive than his predecessor, but weak, and let himself be guided by the extreme faction of the Roman Catholic party The choice of his cousin Ferdinand, a bitter enemy of the Protestants, to be King of Bohemia, in 1617, was the signal for the outbreak of a struggle that had long been seen to be inevitable See THIRTY YEARS' WAR

The Thirty Years' War (1618–48), which was terminated in the reign of Ferdinand III (1637–57), left the rural districts of Germany almost depopulated, its trade and industries crippled, the people burdened with taxes, and the Imperial power weakened by the concessions made in the Peace of Westphalia to the autonomy of the individual states Austria came to be regarded by the German nationalists as a foreign power, and the recognition of the Lutherans and Calvinists as factors in the Empire broke down the religious unity on which the mediæval Empire rested Already, under Henry IV, France had adopted an anti-Hapsburg policy, rightly regarding that house, with its vast possessions, as the chief rival of France in European affairs Richelieu (q v) carried on this policy vigorously during the Thirty Years' War, in assisting the Swedes and the Protestant princes against the Imperialists, and the French arms had a great share in forcing the Roman Catholic powers to terms of peace When the growth of the power of France in the seventeenth and eighteenth centuries threatened the balance of power in Europe, the Hapsburgs were naturally drawn into the coalition against France. (See LOUIS XIV, SUCCESSION WARS, *War of the Spanish Succession*) The Imperialist forces under Prince Eugene of Savoy shared in the victories which put an end to the aggressions of Louis XIV, but the empire derived no substantial advantage, except in the limitation that was put upon the growth of French predominance The emperors during this period were Leopold I (1658–1705), Joseph I (1705–11), and Charles VI (1711–40)

The rise of Prussia now becomes one of the most striking features in German affairs Since

the time of the Great Elector, Frederick William (1640–88), the Margraviate of Brandenburg had been acquiring increased importance as a leading power among the Protestant German states In 1701 the Elector Frederick assumed the title of King in Prussia and was so recognized by his overlord, the Emperor of the Holy Roman Empire Thus, while still a vassal of the Emperor, he took rank by virtue of his royal title with the other independent sovereigns of Europe Prussia, by reason of its rapidly increasing power, its Protestantism, and the energy infused into its administration, came to be the exponent of the German national spirit and of the enmity to Hapsburg domination Frederick the Great (1740–86) was the mighty representative of this idea The long effort of the Emperor Charles VI to secure the guaranty of the European states for the Pragmatic Sanction (q v), which was intended to secure the unquestioned succession of his daughter Maria Theresa in the Hapsburg dominions, did not prevent an active contest which involved Europe in war (1740–48) (See SUCCESSION WARS, *War of the Austrian Succession*) Austria was stripped of the greater part of Silesia by Frederick the Great After an interregnum Charles Albert, Elector of Bavaria, was raised to the Imperial throne as Charles VII in 1742 This was the first time in 300 years that the iron crown rested upon a non-Hapsburg head Charles died in 1745 in the midst of his unsuccessful war with Austria, and the husband of Maria Theresa, Francis Stephen, of the house of Lorraine, was elected his successor, assuming the title of Francis I. The peace which followed the War of the Austrian Succession was of brief duration In 1756 Maria Theresa renewed the struggle with Prussia in order to recover Silesia The historical hostility between England and France and between Austria and Prussia developed into a general European war, in which, by a sudden change of alliances (called the diplomatic revolution), Austria and France, with Russia, were ranged against England and Prussia (See SEVEN YEARS' WAR) Prussia came out of this bloody struggle with enhanced prestige, a recognized military power of the first rank in Europe The well-meant but injudiciously applied reforms of the Emperor Joseph II (1765–90) did not strengthen the incongruous Austrian state, and his attempts to restore the declining Imperial authority in Germany were frustrated by Prussia

The French Revolution disturbed all previous adjustments Austria, under the Emperor Leopold II (1790–92) and his successor the Emperor Francis II, and Prussia, under Frederick William II (1786–97), were for a time united in resistance to the revolutionary propaganda which threatened the thrones of Europe, but were defeated by the French armies The advent of Napoleon played havoc with the Germanic system He succeeded in partially isolating Austria and Prussia, by inducing many of the west German princes to form the Confederation of the Rhine and ally themselves with France (1806) The only ally who supported him through his entire period of success and misfortune was the King of Saxony Francis II in 1806 laid down the title of Holy Roman Emperor, having previously assumed that of Emperor of Austria, which was symbolic of the actual breaking up of the old order and the preparation for a new Germany When Napoleon had been overthrown, it was found, in spite of the policy of conservative reaction, to be neither possible nor desirable to restore the old system The more than 300 semi-independent states which had existed in the eighteenth century had been consolidated by Napoleon into 39 (see MEDIATE), a fact which was of much service in promoting Germany unity Prussia, which had been dismembered by Napoleon and trodden underfoot, emerged from the War of Liberation rejuvenated by the patriotism of its people and strengthened by thoroughgoing reforms and was prepared again to dispute precedence with Austria in the Germanic body Stein, Scharnhorst, Fichte, and Schleiermacher will always be remembered for the constructive ability and foresight they displayed during this period It was manifestly impossible to restore the old Imperial arrangements, which had become worthless long before they were cast aside The Congress of Vienna (see VIENNA, CONGRESS OF), therefore, in 1815 instituted a Germanic Confederation under the guaranty of the European Powers There was to be a federal diet, in which Austria was to have the presidency There was no national army or financial system The executive consisted in making one division coerce another if it refused to carry out the laws

All of the German states were now disturbed by agitations for constitutional government, which were fought inch by inch by many of the princes The dominant spirit among the rulers was that of reaction, and the control of affairs was largely in the hands of the astute Austrian Chancellor, Prince Metternich (q v) Three parties represented the contending ideas of government held in Germany after the Restoration —the absolutists, among whom were found most of the reigning families, including those of Austria and Prussia, the party of historic rights, who had no faith in constitutions, but stood on the traditional customs of the German people, such as the assemblies of estates, and the constitutionalists, liberal and more or less democratic, strongest in south Germany, where the French influence had been most felt This liberalism was especially fostered among the students in the universities (see BURSCHENSCHAFT) and was closely connected with the spirit of nationalism, which was rapidly gaining strength, although for a time it was kept within limited bounds by the governments The chief obstacle to national unity was now, as it had always been, the obstinacy with which the princes clung to their feudal status and to the independence which had grown therefrom The problem had been made simpler by the Napoleonic consolidations, but the princes who remained were made stronger by the same means Only the leadership of some state that should be willing to represent the aspirations of the people and strong enough to coerce resisting states could accomplish what the nationalists sought This rôle was reserved for Prussia The revolutionary agitation of 1830 was felt in Germany and gave some impulse to the constitutional movement, strengthened by the establishment of the Zollverein (q v), or customs union, due to the initiative of Prussia, but it was not until the more stirring year of 1848 that the forces of discontent and progress that had been at work in spite of Metternich's repressive policy really showed themselves in their strength. On March 13 Metternich was driven from power (See

AUSTRIA-HUNGARY) A few days later a successful popular rising took place in Berlin, and at the same time Louis I of Bavaria was compelled to abdicate In April there was a republican insurrection in Baden, which, however, was speedily suppressed In response to the demand for a national parliament, such a body was assembled at Frankfort (May 18, 1848, to May 13, 1849) (See VORPARLAMENT) A provisional national government was organized under an Imperial administrator, the Archduke John of Austria The Parliament, however, was divided into factions, and a struggle between the Austrian and Prussian parties ensued Austria sought to bring its whole Empire into the new organization, with a preponderating voice in affairs, which would have made the new Empire non-German Prussia and the German nationalists objected and finally carried the day, choosing the King of Prussia to be Emperor of the Germans (1849) Frederick William IV was not equal to the great opportunity, and he rejected the proffered crown because it came from the people and not from his peers, the German princes. However, after signing treaties with Saxony and Hanover, the King granted a constitution which was similar to the one proposed at Frankfort The desertion of the national cause by Prussia was followed by insurrections in the Palatinate, Saxony, and Baden, which were rigorously put down, mainly by the arms of Prussia, and the opportunity for the erection of a German nation went by until it should be recreated by the "blood and iron" policy of Bismarck (q v) The national Parliament having gone to pieces, Austria and Prussia united in 1850 to restore the old diet. The two powers now proceeded to establish the old order in the duchies of Schleswig and Holstein, which had risen in revolt against Denmark. Prussia assumed the leadership in proposing plans for reorganizing the Germanic body, but could not harmonize its own ambitions with those of Austria. In 1858 Prince William became Regent of Prussia and in 1861 succeeded his brother as William I Imbued with the conservative spirit of the Hohenzollerns, but possessed of much sound sense, courage, and patriotism, he met the existing situation in a different spirit from that of his weak predecessor Bismarck early became his chief minister and remained at his side until his death The latter saw the futility of all efforts at German organization that had been previously made and determined that the only way to the attainment of the great object was for Prussia to force a direct issue with Austria and fight it out as the champion of German nationality He held to the doctrine that sovereignty could not be exercised by two states over any one district The opportunity was found in the troubled affairs of Schleswig-Holstein (q.v) By the Convention of Gastein (Aug. 14, 1865) Austria and Prussia arranged a joint occupation of the duchies, against the wishes of the smaller states represented in the diet In this common administration, although the sphere of each power was defined, there was ample opportunity for the outbreak of the old rivalry Austria sought to force the hand of Prussia by referring the settlement of the Schleswig-Holstein question to the Federal Diet Prussia met this move by sending its forces into Holstein, which had been under Austrian occupation The Diet ordered the mobilization of the Federal forces (June 14, 1866). Prussia at once began hostilities, having previously formed an alliance with Italy against Austria (See SEVEN WEEKS' WAR) Prussia's preparedness was shown by her prompt action in each detail She ordered Hanover, Hesse-Cassel, and Saxony, which had adhered to Austria, to disarm and at once invaded their territories The Saxon army retired through Bohemia, to effect a junction with the Austrians, the Hanoverians laid down their arms after a useless show of resistance, and the Prussians, having secured their base, declared war against Austria and invaded Bohemia in three columns In the vigorous seven weeks' campaign, whose brief duration has given its popular name to the war, Austria met a succession of defeats, culminating in the overwhelming one of Koniggratz (July 3) By the Peace of Prague (Aug 23, 1866) the dissolution of the old confederation was consummated Austria ceased to be a member of the Germanic body, and Schleswig-Holstein, Hanover, Electoral Hesse, Nassau, and Frankfort were incorporated with Prussia, which negotiated separate treaties with Baden, Bavaria, the Grand Duchy of Hesse, Saxony, and Wurttemberg

The North German Confederation was now constituted under Prussian leadership Bavaria, Wurttemberg, and Baden allied themselves with the new body, though they did not enter it Their treaties with Prussia provided for an offensive and defensive alliance, and acceptance of Prussian leadership in case of war The Constituent Diet of the new confederation met Feb 24, 1867, and proceeded to frame a constitution which forms the basis of that of the present Empire The aspirations of Prussia looked to the completion of German unity by the addition of the south German states and the establishment of the paramount influence of the new German state in European affairs Bismarck was well aware that the consolidation of Germany meant eventual war with Germany's ancient enemy (France), and he prepared for it as thoroughly as he had for the conflict with Austria War was narrowly averted in 1867, when France sought to occupy Luxemburg as a compensation for the territorial acquisitions of Prussia, and in 1869, when France showed unequivocally her desire to annex Belgium The intention of Spain to seat a Hohenzollern prince on the vacant throne offered an opportunity for the quarrel which France was now seeking, and the injudicious conduct of Benedetti, the French Minister at Berlin, combined with the fatuous insistence of the French Foreign Minister, Gramont, upon an impossible apology from King William, and the unscrupulous suppression by Bismarck of a pacific section of King William's reply thereto, stirred a feeling in both countries that could only result in war, which was declared by France, July 19, 1870 The French expected to invade Germany, win over the south German states, and march straight on Berlin Instead they found the German army mobilized on the frontier, and the south German states loyal to their alliance A quick succession of German victories was followed by the surrender of MacMahon's army and the capture of Napoleon himself at Sedan (Sept. 2, 1870), the investment of Paris, and the capitulation of Bazaine at Metz (October 27) While the united armies of Germany were still besieging Paris, King William, at Versailles, received from the people of Germany, in pursuance of

the decree of the North German Diet of Dec 10, 1870, the title of German Emperor, hereditary in the Prussian dynasty (Jan 18, 1871) On the 16th of April the constitution of the Empire, which was substantially that of the North German Confederation, with the addition of certain special provisions for the south German states, was promulgated By the treaty of peace with France, signed on the 10th day of May, at Frankfort on the Main, Germany received the provinces of Alsace, with the exception of Belfort, and the German-speaking part of Lorraine, including Metz and Thionville, and an indemnity of five milliards of francs ($1,000,000,000) See FRANCO-GERMAN WAR

The southern states had all entered the new Empire The military preponderance of France on the continent of Europe was at an end Secure in its position as a dominant power, the new Germany was free to develop its national genius But Bismarck's internal policy during the first years of the Empire was not as successful as his state-building process had been He became involved in a conflict with the Roman church, and this became the leading issue in Imperial politics for six years, from 1873 to 1879 (See KULTURKAMPF) The preponderating position of Germany in the affairs of Europe was asserted at the time of the Russo-Turkish War (1877–78), when the Congress of Berlin was convened for the settlement of the Eastern Question and German diplomacy prevented Russia from making extensive territorial gains in the Balkans After the attempts upon the life of the Emperor in 1878, falsely attributed to Socialist teachings, all Socialistic agitation was prohibited, while, to win over the reform sentiment, the government undertook legislation for the benefit of the working classes, such as compulsory state insurance An extensive system of canals was begun in 1886, including the great Kaiser Wilhelm Canal, connecting the North Sea and the Baltic, which was opened June 19, 1895 As soon as Austria had been expelled from the Germanic body it became Bismarck's policy to cultivate friendly relations with that country, as Germany's closest neighbor and kin, and in 1883 the Triple Alliance (q v), comprising Austria, Germany, and Italy, was formed, with the object of maintaining the balance against France and Russia With an expanding commerce and firmly believing in the doctrine that "trade follows the flag," in 1884 Germany embarked upon her career as a colonizing power (See GERMAN EAST AFRICA; GERMAN SOUTHWEST AFRICA, KAMERUN) Emperor William I died in 1888 and was succeeded by his son, Frederick III, a man of liberal tendencies, but who was then suffering from cancer of the throat, dying in a few months. He was succeeded by his son, William II Differences very early developed between the Kaiser and the great Chancellor, and an issue having been made on the question of the renewal of repressive measures towards the Socialists, Bismarck was ordered to resign, and his resignation was accepted March 20, 1890 He was succeeded by General von Caprivi (q v) The Emperor himself, irritated by the failure of his plan for an international labor conference, became a bitter opponent of the Socialists After 1879 Germany maintained a protective tariff, and duties were considerably increased in several directions, though the operation of the fixed tariff was much modified by tariffs based upon reciprocity treaties The development of German industry and commerce checked the stream of emigration, and the population has continued to increase Caprivi retired from the chancellorship in 1894, giving place to Prince Hohenlohe In the following years the government gave particular attention to the development of a powerful navy to keep pace with the rapid growth of foreign commerce William II actively promoted the development of an aggressive colonial policy in various parts of the world In 1898 he seized the pretext of the murder of two German missionaries in China to exact from that country the cession of the port of Tsing-tao in the Kiao-chow peninsula and 50 square miles of adjacent territory, and to establish a sphere of influence in Shan-tung, one of the richest Chinese provinces He then attempted, following the Boxer movement, to claim for Germany a predominant rôle in the Far East (See CHINA) Prince Hohenlohe resigned the chancellorship in 1900, partly because of disagreement with the Emperor's Chinese policy, and was succeeded by Count, later Prince, von Bulow Economic questions were in the foreground during the next five years A new tariff law was enacted in December, 1902, greatly increasing the duties on foreign food products in accordance with the demands of the Agrarian element The bill was opposed by the Social Democrats, who characterized the measure as an act legalizing "bread usury" The Reichstag elections of June, 1903, were fought out on the tariff issue and resulted in a signal triumph for the Social Democrats, who increased their representation in the Reichstag from 56 to 81, taking second place after the party of the Centre Their popular vote rose from 2,107,000 to 3,010,000 as against 1,875,000 votes cast by the Centre The Agrarians, on the other hand, met with severe reverses To secure the support of the Roman Catholic Centre the government in March, 1904, amended the anti-Jesuit law so as to permit members of the Society of Jesus to take up their residence anywhere in the Empire The keynote to German foreign policy during this period was a growing estrangement from Great Britain, which had its ultimate reason in commercial rivalry and was fostered by the indiscreet conduct of the Emperor at the critical period preceding the outbreak of the South African War, and the violent anti-British tone of the German press during the progress of that struggle In the Russo-Japanese War the German government maintained an attitude of benevolent neutrality towards Russia, but viewing with alarm the growing friendship between France and Great Britain, it took advantage of Russian disaster in the Far East to test the strength of the Anglo-French understanding by antagonizing the policy of France in Morocco (See FRANCE, MOROCCO) During the early months of 1905 war with France seemed imminent, but the Anglo-French agreement held fast, as was shown in the international conference which met at Algeciras in 1906 By this treaty France, together with Spain, was given a protectorate over Morocco In 1904 an uprising broke out in German Southwest Africa (q v) It lasted over two years, and was suppressed with difficulty Believing that the colonial policy was a failure, the Reichstag refused to vote an extra appropriation for colonial purposes and was dissolved in 1906. In the elections of the following year the Kaiser's policy of Imperial

expansion was decisively affirmed by the people The Socialist representation was reduced from 81 to 43 seats, though their popular vote showed an increase Austria's formal annexation of Bosnia and Herzegovina (q v) in 1908 (provinces of the Ottoman Empire first occupied in 1878) caused warlike preparations to be made by Servia and Russia, but the announcement that Germany would support her ally prevented hostilities from occurring and enabled Austria to maintain her action in the two provinces and to prevent an extension of the Serbian railroad system to the Adriatic The Conservative and landed interests predominated in the Reichstag, and the necessity of raising additional revenue to meet the increasing military expenditures was met by taxes levied chiefly on consumption and but slightly on property and income Von Bulow, together with the Left, which for once cooperated with the government, was opposed to this plan, and because of his defeat by the Reichstag Von Bulow resigned and Von Bethmann-Hollweg was appointed Chancellor in his stead The question of electoral reform came up in Prussia during the year 1910, and the ministry succeeded in passing a bill perpetuating the three-class system, whereby 85 per cent of the voting population elect only one-third of the members of the Prussian Lower House, the Landtag By a treaty in 1911 Russia and Germany came to an amiable agreement as to their rights in the Near East—Germany's sphere of influence to continue along the Bagdad Railway, while Russia's supremacy in northern Persia and Kurdistan was acknowledged It was in the same year that Germany became embroiled in another controversy with France over the question of Morocco England supported France and compelled Germany to acknowledge the supremacy of French claims in Morocco, but in return France ceded to Germany 112,000 square miles in the French Congo

The year 1912 marked the election of another Reichstag. A determined effort was made on the part of the Left, consisting of the Social Democrats, Liberals, and Radicals, to break the "blue-black *bloc*," which was composed of the Agrarians, Catholic Centre, and Conservatives The policy of the latter group as represented by the Chancellor was a combination of an aggressive foreign policy with a domestic system of protection to the landed and propertied classes Despite the efforts of the Kaiser, who declared the Social Democrats to be enemies to the Empire, the Left made sweeping gains The popular vote of the Social Democratic party increased to 4,238,000, and their representation in the Reichstag totaled 110 seats The precarious majority of the government in the Reichstag was threatened when the Centre refused to cooperate with the Chancellor because of the refusal of the Bundesrat to remove the Jesuit disabilities of 1872. The Bundesrat gave way, and the Centre returned to the support of the government The rapid increase in the cost of the war armament necessitated the levying of a special tax which was assessed on property values and by a cumulative tax on incomes The disturbances at Zabern in 1913 provoked a storm of criticism of the military system of the Empire, which, when coupled with the significance of the Krupp exposures of that year, showed the strong dissatisfaction of a large class with the militaristic organization of the country

The industrial development of Germany since the founding of the Empire has been one of tremendous economic growth The discovery of stores of coal and iron, the development of an efficient system of industrial education coupled with the encouragement given by the government to industry, have all been factors in the transition of Germany from a country of agriculturists to a nation that is chiefly characterized by manufacturing and by commerce

The political problems that exist are in a large measure due to the failure to readjust the political system to the changed economic life Representation in the Reichstag is still based on the apportionment made in accordance with the population of 1871, since when the cities have greatly increased in population, while the rural districts have declined As a result, there is a demand for reapportionment on the part of the Social Democrats, whose chief strength lies in the underrepresented cities This, together with the three-class system of public voting in Prussia, and the proposition to make the Chancellor responsible to the Reichstag, forms the chief political topic of the day

The foreign policies of Germany have been greatly affected by the creation of the Triple Entente of Russia, England, and France, and she has expended vast sums of money for the building of a fleet and the maintenance of an army Indeed the efforts of Germany, as the head of the Triple Alliance (q v), to become the first power of Europe have probably been the immediate cause of the race for armaments which is so characteristic of Europe at the present time. See POLITICAL PARTIES, *Germany* For a detailed account of the operations of Germany in the European War of 1914 see the article WAR IN EUROPE

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History For a brief treatment of German history, consult Henderson, *A Short History of Germany* (New York, 1908), a product of modern critical scholarship Bryce, *The Holy Roman Empire* (ib, 1892), is a luminous essay that must be studied to understand the political development of Germany and its relations with the Holy Roman Empire One of the best guides is *Quellenkunde der deutschen Geschichte*, ed by Dahlmann-Waitz-Herre (Leipzig, 1912) For general history, consult the *Bibliothek deutscher Geschichte*, by Gutsche and 12 others (Stuttgart, 1876 et seq), excellent, Lamprecht, *Deutsche Geschichte* (12 vols, Berlin, 1891–1909), Gebhardt, *Handbuch der deutschen Geschichte* (2 vols, Stuttgart, 1910), Nitzsch, *Geschichte des deutschen Volkes bis zum Augsburger Religionsfrieden* (3 vols, Leipzig, 1892), Janssen, *History of the German People*, trans by Christie (London, 1907) The history of Germany in mediæval times is adequately treated by Henderson, *History of Germany in the Middle Ages* (New York, 1894), Fisher, *Mediæval Empire* (2 vols, London, 1898), Stubbs, *Germany in the Early Middle Ages* (New York, 1908), id, *Germany in the Later Middle Ages* (ib 1908) The following are standard works by some of the foremost of German historians on the modern period. Marcks, *Germany and England Their Relations in the Great Crises of European History, 1500–1900*, trans (London, 1900), Treitschke, *Deutsche Geschichte im neunzehnten Jahrhundert* (Leipzig, 1879–94), Oncken, *Das Zeitalter der Revolution, des Kaiserreiches und der Befreiungskriege* (Berlin, 1890–92), Bulle, *Geschichte der neuesten Zeit, 1815–71* (Leipzig, 1886–87), Erdmannsdörffer, *Deutsche Geschichte vom westphalischen Frieden bis zum Regierungsantritt Friedrichs des Grossen, 1648–1740* (Berlin, 1892–94), Blum, *Das deutsche Reich zur Zeit Bismarck* (Leipzig, 1893) Useful available books in English are Malleson, *The Refounding of the German Empire, 1848–71* (London, 1893), Muller, *Political History of Recent Times, 1816–75* (New York 1882), translated and brought down to 1881 by Peters, and written with special reference to Germany, Murdock, *The Reconstruction of Europe* (Boston, 1889), Baring-Gould, *Germany, Past and Present* (London, 1881), Eltzbacher, *Modern Germany* (ib, 1905), Ashley, *Modern Tariff History* (ib, 1904), Andrews, *Contemporary Europe, Asia, and Africa* (Philadelphia, 1902), *Cambridge Modern History*, vols x, xi, xii (New York, 1903–12), Schierbrand, *Germany The Welding of a World Power* (ib, 1907), Perris, *Germany and the German Emperor* (London, 1912), Bernhardi, *Germany and the Next War* (ib, 1912), Dove, *Die deutschen Kolonien* (4 vols, Leipzig, 1909–13), Roberts, *Monarchial Socialism in Germany* (New York, 1913), Hurd and Castle, *The German Sea Power* (London, 1913). For German diplomacy and government, consult Debidour, *Histoire diplomatique de l'Europe, 1814–78*, vols i and ii (Paris, 1891), Lowell, *Governments and Politics in Continental Europe* (New York, 1896), Howard, *The German Empire* (ib, 1906), Denis, *La fondation de l'empire allemand* (Paris, 1906), Headlam, *Bismarck and the Foundation of the German Empire* (New York, 1908), Von Bulow, *Imperial Germany* (ib, 1914), Hobbs, *The World War and its Consequences* (New York, 1919); Berger, *Germany After the Armistice* (New York, 1920), Young, *New Germany* (New York, 1920), Clap-

ham, *Economic Development of France and Germany* (New York, 1921) For detailed references on German history, consult the bibliographies of Lavisse and Rambaud, *Histoire générale* (Paris, 1893–1900), Seignobos, *Political History of Europe since 1814* (New York, 1900), and especially Dahlmann-Waitz, referred to above See BISMARCK-SCHONHAUSEN, CALVIN, FREDERICK II, THIRTY YEARS' WAR, ETC

GERMAN Y LLORENTE, hâr-man′ ē lyō-rān′tā, BERNARDO (1685–1757) A Spanish painter, born at Seville He studied under his father and Cristóbal López He painted the portrait of the Infant, Don Philip, with such success that in 1717 he was called to Madrid by Philip V, who desired to make him court painter, but he declined the honor, preferring an independent life In 1735 he was made a member of the Academy of St Ferdinand The works of this artist, though inferior to those of Murillo, yet resemble them in their correctness of drawing and groupings, and in other countries they have been sold as original Murillos He so frequently painted the Virgin as a shepherdess that he was called the "Painter of Shepherdesses" One of these paintings is in the Church of San Ildefonso, Madrid, and another in the Prado

GERM CELL See CELL; EMBRYOLOGY

GERMERSHEIM, gĕr′mĕrs-hīm A town in the Bavarian Palatinate, Germany, situated on the Rhine, 9 miles southwest of Speyer It has manufactories of pressed yeast, creosoted block, ornamental stone work, and beer, also much river trade, and fishing is carried on Pop, 1900, 5868, 1910, 5838 The Romans had a station here under the name of Vicus Julii The French were defeated here by the Austrians in 1793

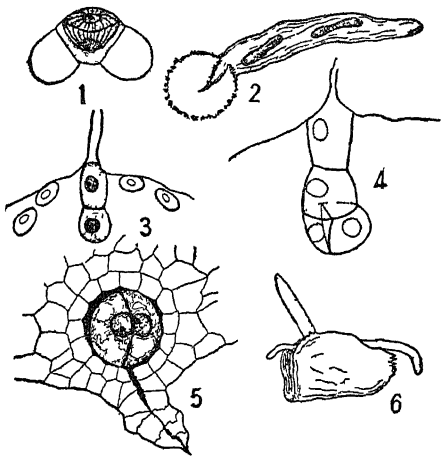
GER′MICIDE. See DISINFECTANTS

GERMINAL, zhâr′mĕ′nal′ (Fr., relating to buds) 1 The name for the seventh month of the year in the French Republican calendar, from March 21 to April 19 during the years I–III, and from March 22 to April 20 during the years VIII–XIII 2 One of the Rougon-Macquart novels by Zola (1885)

GERMINAL INSURRECTION. A name given to the bread riots against the Convention at Paris, which occurred on April 1, 1795 (12th Germinal, Year III)

GERMINATION, jĕr′mĭ-nā′shŭn (Lat *germinatio*, from *germinare*, to bud, from *germen* bud) The process by which a spore begins the development of a plant body Technically, only spores germinate, but this term has been extended to include the process by which the embryo escapes from the seed The so-called germination of the seed, however, is not true germination, since it is the escape of an embryo which has already been germinated, and true germination includes the very beginnings of the young plant In the case of a seed, germination begun by a fertilized egg has been checked, and seed germination is the resumption of activity and the escape of the young plant

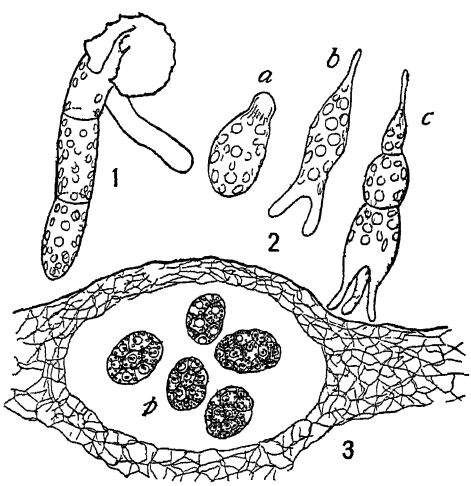
The conditions of germination are uniform In general, they are suitable amounts of water, of heat, and of oxygen Naturally the range in each one of these factors is very great, some spores germinating in the presence of a comparatively small amount of water, or at a relatively low temperature, while others need a large amount of water or high temperature Between these extremes there is every possible combination of requirements Some spores germinate almost immediately after they have been transported from the parent plant, while others may pass into a resting condition of greater or less duration This difference in habit is generally apparent in the different character of



GERMINATION

1 and 2, germination of pollen grain of pine, 3 and 4, young embryo of buttercup, 5 and 6, first and last stages of embryo of a fern

the spore wall, those spores which are to germinate quickly having thin walls, and those which are to pass into a resting condition having thick walls Since the spore consists of a single cell, the first evidence of germination is the activity of the cell, which usually enlarges, and then divides, resulting in a two-celled embryo One or both of the daughter cells then grow to mature size, and division then occurs In this process of growth and division the spore wall is broken and the young plant emerges and con-



GERMINATION

1, young prothallium of a fern, 2, three stages in the germination of a green alga, beginning with the spore (*a*), 3, young plants of a liverwort developing from spores within the sporangium

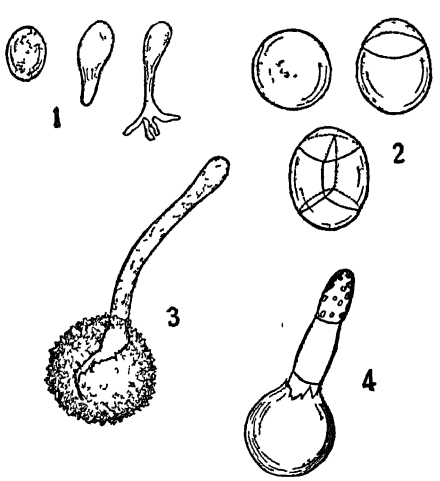
tinues its development by drawing upon the reserve food supply in the spore until it is able to maintain itself

The early stages of germination have attracted a great deal of attention, under the

impression that they furnish proofs of the relationships of groups Accordingly the order of succession and the direction of cell walls have been carefully noted In case the plant is a complex one, after a certain number of cells have been developed, the different regions of the body begin to appear For example, in an embryonic seed plant it would be impossible for a time to tell what kind of plant is to develop, but after a homogeneous cell mass of greater or less extent is formed, the organs begin to appear which determine the character of the plant

In the case of alternation of generations (q v) the germination of the sexual spore (fertilized egg) results in a sexless plant (sporophyte), while the germination of the asexual spore results in a sexual plant (gametophyte) Among the heterosporous plants (those producing two kinds of asexual spores), i e, in certain fern plants and all the flowering plants, the sexual plants (gametophytes) do not escape from the spores which germinate them For example, the pollen grain is a spore which by its germination produces a male gametophyte, but this gametophyte is so much reduced that it is represented only by a few cells or nuclei within the pollen grain The same is true of the germination of the megaspore in seed plants, which is retained within the ovule, and which in its germination develops the so-called endosperm, which is the female gametophyte With the exception of heterosporous plants, however, the germinating plantlet soon escapes from the spore

In the so-called germination of the seed there are numerous events which may be observed Attention has been called already to the fact that this process is not technically germination, but merely the renewal of activity and the escape of the young plantlet. Just how long different seeds may retain their vitality in a state of dormancy is not definitely known



GERMINATION

1, development of *Botrydium* (alga) from the egg, 2, segmentation of egg of a brown alga, 3, a young fungus coming from the egg, 4, young prothallium of *Equisetum*

Some seeds have renewed activity after having remained in a dried-up condition for many years, but such stories as that the wheat taken from the wrappings of Egyptian mummies has been made to germinate are myths. Seed germination results in freeing the embryo from the seed coats, and in enabling it to establish itself for independent living. The first conspicuous change noted in the seed after the absorption of water is the softening of the contents, the solid or insoluble starch, if that be the form of the food storage, being converted by a process of digestion into soluble sugar ready for transfer Accompanying this change there is a marked evolution of heat, so that if a large mass of seeds is set to germinating, as in the process of malting, the heat may become very evident The first part to protrude from the seed is the hypocotyl (q v), the tip of which is thrust out by the rapid elongation of its upper part This protruding and rapidly elongating tip, which is to develop the root, now rapidly increases in length, and is very sensitive to the influence of gravity and of moisture, responding by developing any curvature necessary to reach the soil Penetrating the soil and beginning to put out lateral branches, it secures the grip necessary for the extrication of the other regions of the embryo After some anchorage has thus been obtained the upper part of the hypocotyl again begins a period of rapid elongation, which results in the development of a curve known as the hypocotyl arch In the case of the germinating bean this arch is the first structure to appear above ground, and its pull upon the seed is very apt to bring it to the surface Finally, the arch in its effort to straighten pulls the cotyledons out of the seed coats, and with them the stem tip, the axis of the plant straightens up, the seed leaves and sometimes other leaves expand, and germination is over, for with roots in the soil, and green leaves expanded to the air and sunlight, the plantlet has become independent. These details are not the same for all seeds, for there are certain notable variations For example, in the pea and acorn the cotyledons are so gorged with food as to have lost all power of acting as leaves, and are never extricated from the seed coats In the cereals, as corn, wheat, etc, the embryo lies close against one side of the seed, so that it is completely exposed by the splitting of the thin skin which covers it In such a case the cotyledon is never unfolded, but remains as an absorbing organ, while the root extends in one direction and the stem with its succession of ensheathing leaves develops in the other.

The most recent investigations in reference to germination have had to do with delayed germination, especially of seeds, although the same problem is present in the germination of spores Many seeds and spores cannot germinate immediately, the time elapsing before germination varying widely, but often it is a long period In many seeds it has been found that the delay in germination is due to the exclusion of water or of oxygen by the seed coat. If such coats are punctured or abraded, germination follows promptly In nature these impermeable coats must become more or less disintegrated before germination is possible. Some seeds, however, do not germinate, even when the coats have been removed entirely and the embryo put in good germinating conditions In these cases some change in the embryo is necessary before growth can be resumed, and it is this change that is called "after ripening." The physiological (chemical) changes involved in after ripening have been investigated in the case of certain seeds, and methods have been discovered for shortening the after-ripening period.

The mechanical treatment of impermeable seed coats and the chemical treatment for after ripening have very important practical applications in shortening the period for the production of certain crops

GERMINIE LACERTEUX, zhâr'mē nē' la'sâr'tē' A realistic romance by Edmond and Jules de Goncourt (1865), in which the authors aim to present, as they say, a "clinic of love" It was dramatized by Edmond de Goncourt, and produced at the Odeon in 1889

GERM-LAYER THEORY See EMBRYOLOGY, *Germ Layers*

GERM PLASM. The kind of protoplasm supposed by some embryologists peculiar to the germinal part of the ovum and regarded as containing such chemical or molecular composition and properties as to determine the special character of the resulting organism. This singularity is supposed to be inherited and to continue from generation to generation See BIOLOGY

GERM THEORY OF DISEASE See DISEASE, GERM THEORY OF.

GERNSHEIM, gĕrns'hĭm, FRIEDRICH (1839–1916). A German composer. He was born at Worms, and studied at Mainz (under Pauer), Frankfort on the Main, at the Leipzig Conservatory, and in Paris After conducting at Saarbrucken (1861–65) he was called to the Conservatory of Cologne, where he also conducted several musical societies, and in 1873 was appointed to the leadership of the Maatschappij concerts at Rotterdam. In 1890–97 he taught at Stern's conservatory, and from 1890 to 1904 was conductor of the Stern Choral Society in Berlin, one of the most prominent singing societies of Germany His compositions include four symphonies (Gm, E♭, Cm, B♭), an overture, *Waldmeister's Brautfahrt,* a concerto for piano, one for violin, and one for 'cello, several large choral works, *Salamis, Hafis, Wachterlied, Das Grab im Busento, Nornenlied, Phobus Apollo;* and a great variety of remarkable chamber music

GERO, gā'rō A German hero in the *Nibelungenlied* He is an historic character who, as Margrave of the Ostmark, in 939, conquered all the Slavic tribes between the Elbe and the Oder, and died in 965

GEROK, gā'rŏk, KARL (1815–90) A German preacher and religious poet He was born at Vaihingen, Wurttemberg, Jan. 30, 1815, studied at Tubingen, became chief court preacher in Stuttgart, 1868, and died there Jan 14, 1890 His sermons, and particularly his religious poetry, were much admired The chief collection of the latter was entitled *Palmblatter* (1857), Eng trans by Brown (London, 1869) Consult his life by Braun (Leipzig, 1891); G. Gerok (Stuttgart, 1892)

GÉRÔME, zhā'rōm', JEAN-LÉON (1824–1904). A French painter and sculptor, one of the most eminent artists of the later nineteenth century He was born May 11, 1824, at Vesoul, Haute-Saône, France His father, a goldsmith, encouraged the artistic tendencies of his son Léon's copy of a picture by Decamps was seen by a friend of Delaroche, which led to Gérôme's entering the atelier of that master in Paris, at the age of 15 Three years later he went with Delaroche to Rome With the exception of a few months with Gleyre, all Gérôme's early training was received from Delaroche He assisted Delaroche on his picture of "The Passage of the Alps by Charlemagne," now in the Versailles Museum In 1847 Gérôme was unsuccessful in the competition for the Prix de Rome, but the picture, a "Greek Cockfight," now in the Luxembourg, which he exhibited at the Salon of that year, was the sensation of the day This picture was followed by the "Anacréon, Bacchus, and Cupid" (1848), now in the Museum of Toulouse In 1850 he exhibited the "Greek Interior," and in 1855 the "Age of Augustus," an immense picture now in the Museum of Amiens

All the most splendid qualities of the art of Gérôme appear in the great picture of "Morituri te Salutant" (the Gladiators before Cæsar"), which was exhibited in 1859 In 1854 Gérôme visited the Danube provinces and Egypt, stopping at Constantinople on the way He was made a member of the Institute and professor of painting at the Ecole des Beaux-Arts in 1865, and won a medal of honor at the Universal Exposition of 1867 He was made Chevalier of the Legion of Honor in 1855, Officer in 1867, and afterward Commander

Gérôme painted an enormous number of pictures, which are largely held in the museums of France. He is also well represented in American collections A partial list only can be given He exhibited the "Phryne before the Tribunal" in 1861, "The Two Augurs" and the portrait of Rachel in 1861, the "Cleopatra and Cæsar" in 1866, the "Slave Market" and the "Death of Cæsar" in 1867, and the "Promenade in the Harem" in 1869 He painted the "Plague at Marseilles" as a decoration in one of the chapels of the church of Saint-Sévérin in Paris

Gérôme exhibited his great picture "Pollice Verso," companion to the "Gladiators before Cæsar," in 1873 These two pictures were considered by the painter himself his best works Of his later pictures the most important are "Son éminence grise" (1876, Boston Museum), "Rex Tibicen," "Frederick the Great before the Bust of Voltaire" (1876), "St Jerome" (1878), "Slave Market in Rome" (1884), "Great Bath at Brusa" (1885) The Metropolitan Museum, New York, possesses three of his works, as does also the Vanderbilt collection, including "Louis XIV at the Grand Condé" The Walters Gallery, Baltimore, possesses his "Christian Martyrs" (1863–83), and a replica of the very popular "Duel after the Masquerade," the first rendering of which is in the Chantilly Museum Gérôme was an exceedingly skillful and intelligent painter, but he depended for his effects on his perfect drawing and grouping, his technique is hard and his color often cold.

At the Exposition in Paris in 1878 Gérôme made his début as a sculptor of the first rank with a bronze reproduction of the central group of the "Pollice Verso." The best of Gérôme's later work is in sculpture The most characteristic is a series of bronze equestrian statuettes, among which are "The Entry of Bonaparte into Cairo" (Luxembourg Gallery), "Frederick the Great," and "Tamerlane" His seated statue "Tanagra" and a tinted marble bust of Sarah Bernhardt are in the Luxembourg Museum. In 1902 he completed "L'Aigle expirant," a bronze monument for the battlefield of Waterloo, and the "Game of Ball" Consult his biography by Hering (New York, 1892), Claretie, *Peintres et sculpteurs contemporains* (Paris, 1884); Cook, *Art and Artists of Our Time,* vol i (New York, 1888), Low, "Gérôme," in Van Dyke, *Modern*

French Masters (ib, 1896), Guillemin, *Etude sur le peintre et sculpteur Jean Léon Gérôme* (Besançon, 1905)

GERONA, hā-rō'na A town of Tārlac, Luzon, Philippines, on the Manila and Dagupan Railroad, 9 miles north of Tarlac Pop, 1903, 13,615

GERONA, hā-rō'na An episcopal city, the capital of the province of the same name, Spain, 52 miles northeast of Barcelona, situated at the junction of the rivers Oñar and Ter (Map Spain, G 2) Built at the foot and on the slope of two hills, the fortified Monjuich commanding the city, it comprises two parts, the city proper on the side of the Hill of the Capuchins, with the narrow, dingy streets of a mediæval town (which nevertheless has the finest architectural features), and the modern suburb, El Mercadel, in the plain below The rivers Guell and Galligans empty into the Oñar, the former just north of the city, while the latter flows through it, and many of the houses are built directly on the river's brink—a circumstance that has caused the floods, particularly those of 1762 and 1829, to be extremely disastrous Gerona still retains part of its old walls, but its chief attractions are in its churches The noble Gothic cathedral (begun in 1312), one of the finest in Spain, stands on the site of an earlier church dedicated in 1038, the nave, 73 feet in width, is the widest Gothic vault in the world Also noteworthy are the fourteenth-century church of San Felix and the Romanesque church of San Pedro There are a large poorhouse, a hospital in connection with which is an insane asylum, a theatre, and two public libraries, the provincial library having over 13,000 volumes The citadel serves as a state prison The manufactures of the city comprise paper, cotton and woolen goods, machinery, cork, and in the vicinity coal, iron, copper, and lead are mined There are also mineral springs Pop, 1900, 15,668, 1910, 17,416

Gerona, the ancient Gerunda of the Auscetani, is one of the oldest cities of Spain, its origin being ascribed to the tenth century B C, though it appears first in history during the Punic Wars In the Middle Ages it was known also as Gironda The town submitted to the Moors in 717 and in 797 came finally into the possession of the Frankish borderers, who for a time ruled it in the name of their kings Subsequently it passed into the possession of the counts of Barcelona It was erected into a dukedom about the middle of the fourteenth century, and in 1414 into a principality for the eldest son of the King of Aragon Gerona played a part in the War of the Spanish Succession, suffering severely with the rest of Catalonia It became celebrated for the stubborn fighting qualities of its inhabitants Its crowning exploit was achieved in 1809 in the Spanish War of Liberation, when it held out from June 8 to December 10 against the French, who had invested it in 1808, yielding only when its citizens succumbed to famine and disease

GERON'IMO (c 1834–1909) A chief of the Chiricahua tribe of Apache Indians His native name was Goyathlay (the yawner), and Geronimo is only a Mexican nickname He was born in New Mexico, near old Fort Tulerosa In 1876 with other chiefs he fled to Mexico rather than be removed to San Carlos, Ariz., with the other Chiricahua But he was caught and taken to Arizona In 1882 he led a raid into Sonora, but surrendered to General Crook During 1884–85 there was an attempt to stop the Indian manufacture of intoxicants, and Geronimo with a band of hostile Indians terrorized a great part of New Mexico and Arizona and some of Sonora and Chihuahua Against them, early in 1886, General Sheridan sent Gen George Crook In March a truce was made, and at a conference between Crook and Geronimo terms of surrender were agreed upon Before they could be carried out, however, the Indians escaped to the Mexican mountains, and General Crook was superseded in command by Gen Nelson A Miles General Miles immediately began an active campaign against the Indians He followed them into the mountains until at length Geronimo was glad to accept the terms offered by General Miles, which provided for the deportation of Geronimo and his leading followers to Fort Pickens, Fla Later they were taken to Alabama and then to Fort Sill, Okla Consult *Geronimo's Story of His Life, Taken Down and Edited by S M Barrett* (New York, 1906), and articles on the campaign against him in the *Journal* of the United States Cavalry Association (Fort Leavenworth), vols xix and xxi

GÉRONTE, zhā'rôNt' In French classical comedy, a type of the old man The character appears especially in Corneille's *Le menteur*, in Molière's *Le médecin malgré lui* and *Les fourberies de Scapin*, and in Regnard's *Le joueur*, *Le retour imprévu*, and *Le légataire universel* In the *Menteur* the character has dignity and restrained emotion In the *Médecin malgré lui* and the *Fourberies* he has become purely a grotesque dupe, miserly, obstinate, and credulous.

GEROUSIA, jĕ-rōō'shĭ-a (Γερουσία, from γέρων, *gerōn*, old man) The Council of Elders, or Senate, at Sparta, corresponding somewhat to the Athenian Boule (q v) Consult Gilbert, *Greek Constitutional Antiquities*, Eng trans (London, 1895)

GERRESHEIM, gĕr'ĕs-hīm A town in the Rhine Province, Prussia, a western suburb of Dusseldorf, taken within the city limits in 1909 It is an industrial centre of growing importance, with extensive glass, wire, rivet, and silk factories, and other manufacturing establishments Its Romanesque parish church dates from the thirteenth century Pop, 1905, 14,431

GERRY, gĕr'rĭ, Elbridge (1744–1814) An American statesman He was born at Marblehead, Mass, July 17, 1744, the son of a merchant. He graduated in 1762 at Harvard, where three years later he took a master's degree and, abandoning his original intention of entering the medical profession, became a successful merchant in his native town In May, 1772, he entered upon his long political career as a member of the General Court of Massachusetts, and here immediately identified himself with the Patriot party, particularly as represented by Samuel Adams, with whom from this time forward he was closely associated in opposition to the arbitrary measures of the British ministry. He was appointed by the Legislature, with Hancock and Orne, a member of the Committee of Correspondence, and in 1774 and 1775 was a prominent member of the Massachusetts Provincial Congress, by which, after the battle of Lexington, he was charged with procuring a supply of gunpowder for the Province. Late in 1775 he introduced a bill, passing on November 10, for arming and equipping ships for aggressive service against the British mercantile and

military marine This bill, says Gerry's biographer, Austin, was "the first actual avowal of offensive hostility against the mother country which is to be found in the annals of the Revolution," and the "first effort," as well, "to establish an American naval armament" Samuel Adams spoke of it as 'one of the boldest, most dangerous, and most important measures in the history of the New Yorld, the commencement of a new maritime and military power" In 1776 Gerry was elected to the Continental Congress, in which he served for the next four years, during which time he took an active part in securing the passage of many measures of importance, was a member of various important committees, and in particular was conspicuous as a vigorous advocate of the Declaration of Independence, which he signed He was also prominent as a member of three committees appointed (in September, 1776, July, 1777, and November, 1777) to visit Washington's camp on behalf of Congress, and more especially as a member of a standing committee for superintending the treasury, of which he was for some time chairman, and which exercised a virtual control over the finances of the country throughout the Revolutionary War. He was accused, but apparently with little justice, of supporting, or at least countenancing, the Conway Cabal (q v) in its efforts to displace Washington, and in 1779, as head of the treasury board, came into conflict with Gen Benedict Arnold, some of whose accounts he had refused to audit In February, 1780, he withdrew from Congress owing to its refusal to record the yeas and nays on a question of order raised by him, and the Massachusetts General Court, to which he appealed, sustained him in his position On his return to Massachusetts he was elected a member of both the Upper and the Lower House in the first Legislature under the new State Constitution, and accepted a seat in the latter

In 1783 he resumed his seat in the Continental Congress, which he retained for three years, during which time he was a member of the committee appointed, in 1783, to consider the definitive treaty of peace, was chairman of each of two committees appointed to choose a suitable location for a national capital, and again took a prominent part in the initiation and discussion of financial measures He was also conspicuous in 1784 as an opponent of the Society of the Cincinnati He again became a member of the Lower House of the State Legislature in 1785, declined an appointment to the Annapolis Convention (q v) in 1786, and in 1787 was sent as one of the Massachusetts delegates to the Constitutional Convention at Philadelphia, where he was prominent as an opponent of the Constitution as finally adopted, refusing, along with Randolph and Mason, to affix his signature His chief objections, as stated by himself, were, "that there is no adequate provision for a representation of the people, that they have no security for the right of election, that some of the powers of the Legislature are ambiguous and others indefinite and dangerous, that the Executive is blended with and will have an undue influence over the Legislature, that the judicial department will be oppressive, that treaties of the highest importance may be formed by the President, with the advice of two-thirds of a quorum of the Senate, and that the system is without the security of a bill of rights" After the organization of the government he was elected one of the representatives of Massachusetts in the first and second Congresses under the Constitution Subsequently he remained in retirement at Cambridge until 1797, when, war with France appearing imminent, he was sent, along with Marshall and Pinckney, on an important mission to the French Directory The envoys, unable to secure official recognition, were forced to submit to various indignities and humiliating rebuffs, while disgraceful propositions were made to them by Talleyrand and his secret agents, and Marshall and Pinckney soon left in disgust Gerry, however, being the only Republican on the commission, and therefore being, presumably, more favorably disposed than his colleagues towards the French government, remained for some time longer, at the request of Talleyrand, but accomplished nothing (See X Y Z CORRESPONDENCE) For thus remaining he was acrimoniously attacked by the Federalists upon his return to the United States He was several times defeated for Governor of Massachusetts, but was successful in 1810, and in 1811 was reelected His administration was fiercely criticised by the Federalists on the ground of its alleged partisanship, and color was given to the charge by the enactment by the Republican Legislature of a law, which Gerry signed, but of which he seems to have disapproved, for redistricting the State in such a manner as to annihilate the Federalist majorities in several counties (See GERRYMANDER) From 1813 until his death he was Vice President of the United States He died suddenly on his way to the Capitol, Nov 23, 1814 Consult Austin, *Life of Elbridge Gerry, with Contemporary Letters* (Boston, 1828–29)

GERRY, ELBRIDGE THOMAS (1837–1927) An American lawyer and philanthropist, born in New York City, a grandson of Elbridge Gerry (q v) He graduated at Columbia College in 1857 During his practice as a lawyer he appeared in some important cases and accumulated one of the finest libraries of works on jurisprudence in America In 1867 he was a member of the State Constitutional Convention He became prominently connected with numerous reformatory and benevolent organizations, and in 1874 founded the Society for the Prevention of Cruelty to Children, of which he was president in 1876–1901, until 1899 he was vice president of the American Society for the Prevention of Cruelty to Animals In 1886–88 he was chairman of the New York State commission which substituted electrocution for death by hanging He was commodore of the New York Yacht Club in 1886–93, and was a director in several large trust companies With A F Currier he wrote *Corporal Punishment for Certain Forms of Crime* (1895)

GERRYMANDER, gĕr'rĭ-măn'dĕr A word belonging to the political vocabulary of the United States and used to denote an unfair division of the electoral districts in a State, made in the interest of one of the political parties The word was coined in 1812, though the practice was in use as early as the beginning of the eighteenth century At that time the Federalist and Republican parties in Massachusetts were nearly evenly balanced in numerical strength, but the Republicans took advantage of a temporary majority in the Legislature to divide the State into new senatorial districts in such a manner that those sections which gave a large number of Federalist votes might be brought

into one district Previously each county had constituted a senatorial district, and the power of rearranging old districts or creating new ones, bestowed on the Legislature by the State constitution, had never been exercised Elbridge Gerry (q v) was at that time Governor, and through his signature, though he seems not to have wholly approved the measure, the work of the Legislature became a law The form of one of the districts into which Essex County was divided was somewhat like that of a monstrous animal, and when some one suggested that it looked like a salamander, the name "gerrymander" was given to it instead The passage of the law caused a great outcry from the Federalists, and early in 1813, this party having again secured a majority and elected a Governor (Caleb Strong) to succeed Gerry, the law was repealed The device, however, has since been repeatedly used in various States For an account of the origin of the term, consult Dean, "The Gerrymander," in the *New England Historical and Genealogical Register*, vol xlvi (Boston, 1892), and Griffith, *The Rise and Development of the Gerrymander* (Chicago, 1907)

GERS, zhâr An interior department in the southwest of France, formerly portions of the provinces of Gascony and Guienne (Map France, S, E 5) Area, 2428 square miles Pop, 1901, 238,448, 1911, 221,994 While the surface is hilly, its highest point does not exceed 1300 feet Its principal rivers are the Gers, the Adour, Save, Gimone, and Bayse Over 24 per cent of the surface is devoted to the cultivation of the grape, from which large quantities of brandy and wine are manufactured The brandy produced in this department is known as Armagnac and is considered as second only to that of Cognac Wheat, oats, and flax are extensively grown The cattle-raising industry is important, and there is a brisk trade in turkeys and geese Capital, Auch

GERSAU, gĕr'sou A health resort of Switzerland, situated in the Canton of Schwyz on the north bank of Lake Lucerne (Map Switzerland, C 1) Its situation is very picturesque and its equable and mild climate makes it a very desirable winter resort for invalids, while in summer it is a crowded and popular tourist resort For four centuries after 1390 Gersau was entirely independent, forming the smallest republic in Europe At the formation of the Helvetic Republic in 1798 Gersau became a part of the Canton of Waldstatten, and was subsequently (1803) incorporated with the Canton of Schwyz Pop, 1900, 1887, 1910, 1821

GER'SHOM, or **GER'SHON** A name given to two individuals in the Old Testament 1. The first-born son of Moses and Zipporah, according to Ex ii 22, xviii 3 In Judg xviii 30, Gershom, or Gershon, is said to be the father of Jonathan, the priest officiating at the sanctuary of Dan (see HIGH PLACE), and the son of Manasseh or Moses The only difference between these two names when written with the Hebrew characters is the letter *nun* While Manasseh is found in many manuscripts, most frequently the *nun* is put above the line, and in some cases it has been added by a later hand Most of the ancient versions read "Manasseh", but some manuscripts of the Greek version and the Latin Vulgate read "Moses." It is therefore difficult to determine what the original reading was. Evidently the priesthood at Dan traced its origin either to Manasseh or to Moses, or to both at different periods As the 13 cities assigned to the Levitic clan of the Gershonites were all in eastern Manasseh, Issachar, Asher, and Naphtali (Josh xxi 27, 33), it is possible that the Gershonite priesthood at Dan considered itself of Manassite origin, and even that the cult in this place was once devoted to the divinity who afterward became the eponymous hero of the tribe of Manasseh A claim to Mosaic descent would then be a later development Another view is that the suspended *nun* is a device to gloss over the unpleasant fact that a grandson of Moses was priest at a temple where a Yahwe image was worshiped The priestly legislation knows of no sons of Moses in the priesthood 2 The first-born son of Levi, according to Ex vi 16, Num iii 17, 1 Chron vi 1, 16, xxiii 6 In reality this Gershon is the eponym of a Levitic family in the Persian and Greek period In the sketch of the tabernacle in the wilderness, the Gershonites are the carriers of curtains, coverings, screens, and hangings belonging to this movable sanctuary In the narrative of David's reign they figure as musicians belonging to the family of Asaph It is probable that the Gershonites furnished some of the musicians as well as some of the janitors for the second temple Whether they were descendants of the Gershonites who once were priests at Dan is not certain, but it is quite probable

GERSON, zhâr'sŏn', JEAN CHARLIER DE (1363–1429) An eminent French scholar and divine He was born at Gerson, in the Diocese of Rheims, Dec 14, 1363 He entered the University of Paris, and studied theology under the celebrated Pierre d'Ailly Here he rose to the highest honors of the university and, when only 32, to its chancellorship (1395), having acquired by his extraordinary learning the title of "the Most Christian Doctor" He did much for the reform of the university During the contests which arose out of the rival claims of the two lines of pontiffs in the time of the Western Schism (q v) the University of Paris took a leading part in the negotiations for union, and Gerson was one of the most active supporters of the proposal of the university for putting an end to the schism by the resignation of both the contending parties He visited the other universities, in order to obtain their assent to the plan proposed by that of Paris But although he had the satisfaction to see this plan carried out in the Council of Pisa (1409), it failed to secure the desired union In a treatise inscribed to his friend Pierre d'Ailly, he renewed the proposal that the rival pontiffs (now not two, but three, since the election of John XXII at Pisa) should be required to resign, and in the new council which met at Constance in 1414 he was again the most zealous advocate of the same expedient of resignation It is to him also that the great outlines of the plan of Church reformation, then and afterward proposed, are due (See CONSTANCE, COUNCIL OF) But his own personal fortunes were marred by the animosity of the Duke of Burgundy and his adherents, to whom Gerson had become obnoxious, and from whom he had already suffered much persecution, on account of the boldness with which he had denounced the murder of the Duke of Orléans To escape their vengeance he was forced to remain in exile, and he retired from Constance (1418) in the disguise of a pilgrim, to Rattenberg, in Bavaria, where he composed his celebrated work, *De Consolatione Theologiæ,*

in imitation of that of Boethius, *De Consolatione Philosophiæ*, later he went to Neuburg It was only after the lapse of two years that he was enabled to return to France and take up his residence in a monastery at Lyons, of which his brother was superior He devoted himself in this retirement to works of piety, to study, and to the education of youth He died in Lyons July 12, 1429 His works fill five volumes in folio Among the books formerly ascribed to him was the celebrated treatise *De Imitatione Christi*, but it is no longer doubtful that the true author is Thomas à Kempis (q v) The best and most complete edition of his works is by Dupin (Antwerp, 1706) Consult his life by Schwab (Wurzburg, 1858), Jadart (Rheims, 1882), Reynolds, *Early Reprints for English Readers John Gerson* (London, 1880), Bess, *Zur Geschichte des Konstanzer Konzils* (Marburg, 1891), Creighton, *History of the Papacy*, vols i and ii (London, 1882)

GERSON, gĕr'sŏn-y', WOJCIECH (1831–1901) A Polish historical painter, born at Warsaw He began his studies at the School of Art, and continued them at the Academy of St Petersburg, and under Léon Cogniet in Paris Subsequently appointed professor in his native city, he exercised a far-reaching influence upon the promotion of art in Poland as the master of many of the distinguished Polish painters of the day, and as the founder of the Art Society in Warsaw He was a member of the St Petersburg Academy Among his highly valued pictures, noted for thoughtful conception and high finish, may be mentioned "Conversion of the Slavs to Christianity in the Tenth Century", "Queen Hedwig in the Castle at Cracow", "Count Casimir the Righteous", "Copernicus in Rome", "Haughty Queen Rixa of Poland," besides many other episodes from Polish history

GERSONIDES, gĕr-sŏn'ĭ-dēz, or LÉON DE BAGNOLS (c.1288–1344) A distinguished Jewish philosopher, physician, astronomer, and commentator, known in Jewish literature as Levi ben Gerson He was born in Arles, of a family of scholars He made many accurate observations in astronomy, and wrote commentaries on parts of the Bible. His best work is called *Milkhamot Adonai*, "Wars of the Lord," and is a daring philosophical treatise Though his philosophy is based on that of Maimonides, it passes beyond this writer in various points His works gained a reputation among Christian scholars, and certain portions were translated into Latin by order of Pope Clement VI (1342). He died at Perpignan. Consult Joel, *Levi ben Gerson als Religionsphilosoph* (Breslau, 1862), and Winter and Wunsche, *Judische Litteratur*, vol. ii (Treves, 1894).

GERSOPPA (gĕr-sŏp'pâ) **FALLS.** The finest falls in India on the Sharawati River, 30 miles southeast of Honawar at the mouth of the river on the west coast. It consists of four falls known as the Great, the Roarer, the Rocket, and the *Dame Blanche*, or White Lady, names descriptive of their general features They descend on three sides of an immense chasm 600 feet wide, the Great Fall leaping down 829 feet into an enormous pool 132 feet deep.

GERSTACKER, gĕr'stĕk-ĕr, FRIEDRICH (1816–72) A German romancer of adventure Born in Hamburg, May 10, 1816, the son of an opera singer, and left early an orphan, he came to the United States in 1837, and for seven years wandered over the country supporting himself as a jack of all trades and for some time as a hunter In 1843 he returned to Germany and turned his experiences to profitable account in the widely popular *Streif- und Jagdzuge* (1844), *Die Regulatoren in Arkansas* (1845), *Die Flusspiraten des Mississippi* (1848), and many other volumes of similar character In 1849 Gerstacker came again to America and visited also Polynesia and Australia, basing on this voyage his *Tahiti*, and an Australian story, *Die beiden Straflinge*, both of which are among his best work In 1860 he went to South America, and in 1862 accompanied Duke Ernest of Saxe-Coburg-Gotha to Egypt and Abyssinia In 1867–68 he revisited the United States, traveling also in Mexico, Ecuador, Venezuela, and the West Indies, and he gave a vivid account of his experiences in *Neue Reisen* (1868), and in several novels, *Die Missionare* (1868), *Die Blauen und die Gelben* (1870), and others Gerstacker's gifts of description are very considerable, his character drawing is vivid and realistic, his style straightforward and unstudied Many of his stories have been popular in English translations He died in Brunswick, May 31, 1872 His collected works appeared in 44 vols (1872–79)

GERSTACKER, KARL EDUARD ADOLF (1828–95) A German zoologist He was born and educated in Berlin, where in 1857 he was appointed lecturer on zoology at the university and director of the entomological collection in that institution During the last 20 years of his life he was professor of zoology and director of the zoological museum at Greifswald His principal works include· *Entomographien* (vol i, 1858), *Zur Morphologie der Orthoptera Amphibiotica* (1873), *Die Wanderheuschrecke* (1876), and *Der Coloradokafer* (1877)

GERSTENBERG, gĕr'sten-bĕrk, HEINRICH WILHELM VON (1737–1823) A German poet, dramatist, and critic, born at Tondern (Schleswig) He was educated at Jena, entered the Danish army, became a captain of cavalry in 1763, and in 1766 was retired from the service on half pay In 1771 he resigned, in 1775 was appointed Danish consul at Lubeck, and from 1785 to 1812 was legal director of the royal lottery at Altona He is known for three works of important influence in German letters His *Gedicht eines Skalden* (1766) introduced into German literature a revival of Norse mythology His tragedy *Ugolino* (1768), based on Dante, sympathetically criticized by Lessing, attracted much attention and was one of the earliest *"Sturm und Drang"* dramas His *Briefe uber Merkwurdigkeiten der Litteratur* (1766–70) contributed much in German towards a just estimate of Shakespeare, and by its complaint against the reigning formality in German literature indirectly helped to prepare the way for the *"Sturm und Drang"* A collection of his *Vermischte Schriften*, edited by himself, appeared in 1815

GERSTER, gĕr'stĕr, ARPAD GEYZA (CHARLES) (1848–1923) An American surgeon He was born at Kassa, Hungary, graduated in medicine at the University of Vienna in 1872, and was assistant surgeon in the Austrian army in 1872–73. He served after 1878 as surgeon at the German Hospital and after 1879 at Mount Sinai Hospital (both in New York City); was professor of surgery at the New York Polyclinic in 1882–94, and became professor of clinical surgery at Columbia University In 1911–12 he was president of the American Surgical As-

sociation He is author of contributions to medical journals and of *Rules of Aseptic and Antiseptic Surgery* (1888, 3d ed, 1890)

GERSTER, ETELKA (MME GARDINI) (1855–1920) A Hungarian singer, born at Kaschau After studying at the Vienna Conservatory under Marchesi she made her début in 1876 as Gilda in *Rigoletto,* subsequently singing with great success in Marseilles, Genoa, and Berlin In 1877 she married Pietro Gardini In 1878 (and again in 1883 and 1887) she made a tour of the United States, and also sang in the principal European cities In 1896 she opened a singing school in Berlin After 1905 she was connected with the Institute of Musical Art in New York City

GERSTNER, gĕrst'nēr, FRANZ ANTON VON (1793–1840) An Austrian engineer, a son of Franz Josef von Gerstner (1756–1832) He was born and educated at Prague, and in 1818 was appointed professor of practical geometry at the Polytechnic Institute, Vienna He went to England several times to investigate railroad building in that country, especially the road from Liverpool to Manchester, which was at that time in course of construction In 1823–24 he made the plans of the Budweis-Linz (horse-power) Railroad, the first to be constructed on the continent of Europe (opened 1832) He built the road from St Petersburg to Tsarskoye-Selo, and organized other railroads in Russia In 1838 he visited America, where he examined the railroads then either built or building in the United States Two years after his sudden death in New York City a description of his American tour was published by his wife under the title *Beschreibung einer Reise durch die Vereinigten Staaten von Nord-Amerika* (1842) A similar work, but more technical in character, embodying the investigations of Gerstner in America, was edited in 1842 by L Klein, under the title *Die inneren Kommunikationen der Vereinigten Staaten von Nord-Amerika,* an interesting work in two volumes on the means of communication then existing in the United States

GER'TRUDE 1 A Belgian saint (626–59), whose fête is celebrated on March 17. She was the daughter of Pepin of Landen and Ida of Aquitaine Dagobert I urged her to marry him, but she refused and, taking the veil, became abbess of Nivelles in Brabant A number of churches in Belgium are dedicated to her She is a patron of travelers, especially by sea, and is held to give protection from rats and mice and fever She is represented in art with rats and mice about her 2 Saint GERTRUDE of Eisleben (1256–1311), called Gertrude the Great, entered the convent of Helfta when 5 years old and became a great student Her mystical visions began in 1271, and from that time she gave herself particularly to the study of the Scriptures Her visions she describes in *Legatus Divinæ Pietatis* and the seven *Exercitia Spiritualia* (1662), often reprinted Her fête is kept on November 15

GERTRUDE OF WYO'MING A pathetic and graceful, though not flawless, poem by Thomas Campbell, which appeared in 1809

GERUSALEMME LIBERATA, jā-rōō'sa-lĕm'mā lē'bā-ra'tā (It, Jerusalem Delivered) A famous poem by Torquato Tasso, published at Venice, 1580, in 16 cantos, the narrative of real and fictitious events connected with the First Crusade and the deliverance of Jerusalem under Godfrey of Bouillon English translations were published by Fairfax in 1600 and by James in 1865 and 1884

GÉRUZEZ, zhā'rū'zā', (NICOLAS) EUGÈNE (1799–1865) A French critic, born at Rheims He was the nephew of Jean Géruzez (1763–1830), the author, and held the chair of eloquence at the Sorbonne for 19 years Besides contributions to the best journals of the time, he wrote a number of valuable critical works, such as *Histoire de l'eloquence politique et religieuse en France au XIVème, XVème et XVIème siècles* (1837–38), *Essais d'histoire litteraire* (1838), *Histoire de la littérature française depuis ses origines jusqu'à la Révolution* (1852), *Histoire de la littérature française pendant la Révolution* (1859), *Mélanges et pensées* (1886)

GERVAIS, zhâr'vā', ALFRED ALBERT (1837–1921). A French admiral, born at Provins After serving in the Crimean, Chinese, and Franco-German wars, he was appointed captain in 1871 In 1884 he became chief of staff in the Naval Department at Paris He became rear admiral in 1887, vice admiral in 1892, and commanding admiral of the Mediterranean squadron in 1896, and in 1900 commanded the canal squadron which received the Czar at Dunkirk

GERVAIS, FRANÇOIS LOUIS PAUL (1816–79) A French paleontologist, born in Paris He graduated there as doctor of sciences and of medicine, and in 1835 was appointed assistant to Blainville, professor of comparative anatomy at the Paris Museum In 1841 he became professor of zoology and comparative anatomy in the Faculty of Sciences of Montpellier, in 1865 professor at the Sorbonne, Paris, and in 1868 professor of comparative anatomy at the Museum of Natural History He was appointed a correspondent of the Institute of France in 1861, and elected a foreign member of the Geological Society of London in 1875 He early began the study of the "insecta aptera" of Linnæus, particularly the myriapods, and prepared the *Histoire naturelle des insectes apteres* (1844–47), comprising volumes three and four of the *Suites à Buffon* begun by Walckenaer It is, however, for his researches concerning the Tertiary mammalia that he is best known. In this field his most important contributions are his *Histoire naturelle des mammifères* (1854–55) and *Zoologie et paléontologie générales* (1867) The *Recherches sur les mammifères fossiles de l'Amérique Méridionale* (1855) should also be mentioned

GERVASE (jĕr'vāz) **OF CAN'TERBURY** (?1141–?1210) An English chronicler He became a monk of Christ Church, Canterbury, in 1163, and sacristan in 1193, and seems to have spent all the rest of his life there His earliest known work is a *Tractatus de Combustione et Reparatione Cantuariensis Ecclesiæ,* being an account of the conflagration of 1174, and of the subsequent process of rebuilding, written probably in 1185 This was followed by *Imaginatio Gervasii Quasi Contra Monachos Cantuariensis Ecclesiæ,* and other treatises containing a detailed relation of the clerical disputes at Canterbury Gervase's *Chronica* of the times of Stephen, Henry II, and Richard I, probably begun about 1188, brings the history down to the death of the last-named King His *Actus Archiepiscoporum Cantuariensium* comes down to the death of Hubert Walter in 1205 His *Gesta Regum* extends from Brutus to 1210, and is continued by other authors to 1328 In addition, he wrote a *Mappa Mundi,* a survey of the counties of Eng-

land Gervase died, probably, very soon after 1210 All of his works have been edited by Stubbs, in two volumes, Rolls Series (1879–80) The preface contains a full account of his life

GERVASE OF TIL'BURY (fl c 1175–1215) A mediæval writer on historical and philosophical subjects, born probably at Tilbury in Essex, England He seems to have been brought up in Italy, and to have studied and taught at Bologna He was at Venice in 1177 when Frederick I and Alexander III met He was at the English court about 1183, and later went to Sicily In 1190 he was at Salerno He entered the service of Otho IV, who made him Marshal of the Kingdom of Arles, and to whom he dedicated his only extant work, the *Otia Imperialia* This was written about 1211–1214, and is divided into three parts In the first Gervase discusses the events in the early chapters of Genesis, the origin of music, etc , in the second he treats of history, geography, and politics, in the third, of marvels The last is exceedingly valuable for the light it throws upon the beliefs of the age This work was published in Leibnitz, *Scriptores Rerum Brunsvicensium* (2 vols, Hanover, 1707–10) Consult Molinier, *Les sources de l'histoire de France* (Paris, 1903)

GERVEX, zhâr'vă', HENRI (1852–1913). A French genre and portrait painter, born in Paris He was the pupil of Cabanel, Brisset, and Fromentin, and first exhibited in 1873 His "Satyr Playing with a Bacchante" (1874) is in the Luxembourg After this date his works were more often of contemporary life These include "Communion at the Church of the Trinity", "The Lady with the Masque", "Rolla," a fine nude, excluded from the Salon of 1878, "The Return from the Ball", and "Dr Péan at La Salpêtrière," a realistically treated scene in an operating room, one of the first works in this genre to be represented in modern art. In this as in all his works, the technique is excellent, the color quiet and harmonious, the handling of light very skillful With Blanchon he produced four decorative paintings of civil subjects for the mayor's office of the nineteenth arrondissement His portraits are notable, particularly "The Picture Jury" (1885) and the portrait of Madame V de la B, both in the Luxembourg He received the cross of the Legion of Honor in 1889 In 1900 he exhibited "The Coronation of Nicholas II at the Kremlin," and in 1913 was elected to the Academy des Beaux-Arts to succeed Aimé Morot

GERVILLE-RÉACHE, jĕr'vĕl'-rā'ăsh', JEANNE (1882–1915) A French dramatic mezzo-soprano, born at Orthez, France She received her first musical instruction from her father and local teachers In 1899 she studied with Rosine Laborde in Paris, in 1899–1900 with Pauline Viardot-Garcia and Jean Criticos She made her début as Orphée, in Gluck's opera, at the Opéra Comique in Paris in 1900 In 1902 she sang at the Théâtre de la Monnaie in Brussels From 1904 to 1906 she appeared as guest in London and throughout France, from 1907 to 1910 she was one of the principal artists of the Manhattan Opera House in New York, in 1911–12 of the Chicago Opera Company, appearing also as guest with the Boston Opera Company In 1913–14 she was a member of the National Opera Company of Canada During 1910 and 1912 she made extended concert tours of the United States At the première of *Pelléas et Mélisande* she created the part of the Queen Her voice was a rich mezzo-soprano which she used with rare skill Her repertoire included Italian, French, and German operas In 1908 she was married to Dr Gibier-Rambaud, the director of the Pasteur Institute at New York

GERVINUS, gĕr-vē'nus, GEORG GOTTFRIED (1805–71) A German historian and literary critic He was born at Darmstadt, May 20, 1805, studied, after some years devoted to commercial pursuits, at Giessen and Heidelberg, taught at Frankfort, and became professor at Heidelberg in 1835 and at Gottingen in 1836 He had already printed some historical work of minor value, but now began the publication of what came at last to be known as his *Geschichte der deutschen Dichtung* (1835–42, 5th ed, 1871–74) (the first attempt at a scientific treatment of the subject), which has passed through many editions In 1837 he, in common with six other liberal professors, lost his chair by a protest against the suspension of the Hanoverian Constitution, was banished, and traveled for a time in Italy In 1844 he received a call to Heidelberg as professor Some years were now given to political writing in pamphlets and periodicals in the interest of constitutional liberty, but the failure of liberal hopes in 1848 brought him back to literature He wrote four volumes on *Shakespeare* (1849–50), a liberal and very influential *Geschichte des neunzehnten Jahrhunderts* (8 vols, 1853–66), *Handel und Shakespeare* (1868), and *Handel's Oratorientexte uberset zt von Gervinus* (1873) He died at Heidelberg, March 18, 1871, deeply dissatisfied with the manner in which Prussia had brought about the unification of Germany Consult *G G Gervinus Leben: von ihm selbst* (Leipzig, 1893)

GERWIG, gĕr'vĭk, ROBERT (1820–85) A German railroad engineer, born at Karlsruhe and educated at the Polytechnic Institute in that city In 1866 he projected the railroad through the Black Forest, and completed that difficult piece of engineering, with its numerous tunnels, in seven years From 1872 to 1876 he had charge of the building of the St Gotthard Railroad, which, together with Beckh, he had planned He afterward was appointed director of construction for the railways of Baden

GERYON, jē'rĭ-ŏn, or **GERYONES,** jē-rī'ō-nēz (Lat, from Gk. Γηρυών) In Greek mythology, the son of Chrysaor and Callirhoe, a giant with three heads and three bodies, the ruler of the western island Erythia (see HESPERIDES), where he kept a great herd of cattle They were guarded by the herdsman Eurytion and by a monstrous two-headed dog Orthros, both of whom Hercules slew, together with Geryon himself, when he went to carry off the cattle as one of his 12 labors On his return from this expedition Hercules made his way into Italy and to the site of Rome, there he slew Cacus and so aided Evander

GESELLSCHAFT DER ÖSTERREICHISCHEN MUSIKFREUNDE, ge-zĕl'shaft dĕr ē'ster-rīk'ĭsh-en mōō-zēk'froin'de (Ger, Society of Austrian Friends of Music) One of the oldest orchestral organizations in Europe It was the direct outcome of a festival concert given in Vienna on Nov 29, 1812, in aid of the sufferers from the war with France The work performed was Handel's *Timotheus*, which was received so favorably that the performance was repeated December 3 Then Sonnleithner issued a circular urging all persons interested in music to form a society for the performance of larger

works Many lovers of the art responded, so that in 1814 the statutes of the new society were approved by the Emperor Francis I At the head of this organization was a "protector," who was always a nobleman The first protector was Beethoven's pupil, the Archduke Rudolf In 1835 the office of protector was abolished, and a president elected, who for many years was also a nobleman But in 1867 artistic considerations led to the election of the citizen Dr F Egger For the first five years the programmes consisted of oratorios, then mixed programmes were substituted, and even choral works were not excluded All members were on an equal footing The conductor was chosen by lot from among the members, many of whom were amateurs Symphonies were performed in a curious and inartistic manner, Italian arias being interspersed between the different movements until as late as 1846 Not before 1824 was a symphony (the *Eroica*) performed consecutively and in its entirety After 1840 the artistic standard of the society declined Programmes were arranged with bad taste, the execution became careless, and new works and composers were ignored The establishment of the Akademie der Tonkunst in 1851 led to a radical reform of the Gesellschaft, Hellmesberger being then elected a conductor This ambitious and energetic musician filled the places of amateurs by professional musicians, offered artistic programmes, and brought the orchestra to a high degree of technical efficiency New composers now also found a ready hearing This work was continued by the new conductor, Herbeck, who was elected in 1859, and ever since its concerts have been among the musical events of Vienna Among the conductors of the Gesellschaft have been Brahms and Richter Since 1904 Franz Schalk has been the conductor Consult Perger and Hirschfeld, *Geschichte der K K Gesellschaft der Musikfreunde in Wien* (Vienna, 1912)

GESEL'SCHAP, FRIEDRICH (1835–98) A German historical painter He was born at Wesel and studied at the Dresden Academy, then under Mintrop and Bendemann in Dusseldorf, and from 1866 to 1871 in Rome, where he gave his special attention to the monumental fresco paintings of Raphael and Michelangelo. In Berlin he became more widely known by his competitive designs for the decoration of the Kaiserhaus in Goslar (1877), and attained celebrity with his mural paintings in the Ruhmeshalle (Hall of Fame) in Berlin, executed in 1882–90, and representing in numerous ideal figures "A Roman Triumphal Procession," "War," "Peace," "Walhalla," and "The Reerection of the German Empire" He also designed three stained-glass windows in the Dankeskirche at Berlin, and painted a frieze in the Berlin Academy of Arts In 1882 he was elected a member, and in 1884 senator, of the Berlin Academy, and received the title of professor Consult Donop, *Friedrich Geselschap und seine Wandgemalde in der Ruhmeshalle* (Berlin, 1890), and his biography by Von Ottingen (ib, 1898)

GESENIUS, *ge-zā'nē-us*, WILHELM (1786–1842) One of the greatest German Orientalists and biblical scholars He was born at Nordhausen and educated at the Gymnasium of his native town and at Helmstedt and the University of Gottingen After having been for a short time teacher in the pædagogium at Helmstedt, he became, in 1806, a theological *repetent*, or tutor, in Gottingen, and in 1809 was appointed professor in the Gymnasium of Heiligenstadt In 1810 he received a call to Halle as assistant professor of theology and was made full professor in the following year In 1820 and again in 1835 he traveled extensively, making investigations in various libraries In 1827 he was called to Eichhorn's position at Gottingen, but declined the call In 1810–12 he published a *Hebrew and Chaldaic Dictionary of the Old Testament* In 1813–14 appeared his *Hebraisches Elementarbuch*, consisting of a Hebrew grammar and a reading book, which were also published separately This dictionary and grammar, as they have been successively revised and translated (14th ed of the lexicon ed by Buhl, 1905, 27th ed of grammar ed by Kautzsch, 1902), are still standard books of reference, not only throughout Germany, but also in Great Britain and America Of Gesenius' numerous other writings, the following may be mentioned *Kritische Geschichte der hebraischen Sprache und Schrift* (1815), *De Pentateuchi Samaritani Origine* (1815), a translation of the prophet Isaiah with commentary (1820–21), *Ausfuhrliches grammatisch-kritisches Lehrgebaude der hebraischen Sprache* (1817), and *Scripturæ Linguæque Phœniciæ Monumenta quotquot supersunt* (3 vols, 1837) His larger lexicon of the Hebrew language, *Thesaurus Philologus Criticus Linguæ Hebrææ et Chaldææ Veteris Testamenti* (3 vols, 1829–58), which would undoubtedly have been his greatest achievement, but which was interrupted by his death, was completed in 1858 by E Rodiger Gesenius' great merit was his placing the study of Semitic languages on a sound philological basis. His method of interpreting the Old Testament was rationalistic Both Semitic philology and biblical exegesis have advanced far beyond the point to which he carried them, nevertheless, his methods and principles underlie much of the work that has been done since his time and that is still being done Consult Hayne, *Gesenius, eine Erinnerung fur seine Freunde* (Berlin, 1842)

GESHUR, *gē'shûr* 1 An Aramæan State, east of the Jordan, probably in the southern part of modern Jaulan Its northern neighbor was Maacah According to 1 Chron ii 23, the latter took certain villages belonging to the Israelitish clan of Jair in Bashan In Deut iii 14, Joshua xii 5, Geshur and Maachah are said to border on the territory of Og of Bashan It is not impossible that Ishbaal, the son of Saul (c 1033–1026 B C), held possession of Geshur (2 Sam ii 9, Pesh, Vulg), though it was subsequently independent Many scholars hold that it was of this Geshur that Talmai, David's contemporary, was King. 2. In Josh xiii 2, and 1 Sam xxvii 8, a Geshur is mentioned, but it seems to have been situated in southwest Palestine This Geshur was attacked by David from Ziklag As Talmai also occurs as the name of a Hebronite giant (Judg i 10), and Maacah as the name of a concubine of Caleb (1 Chron ii 48), it is possible that King Talmai of Geshur (2 Sam iii 3), whose daughter Maacah became David's wife and Absalom's mother, may have belonged to this southern clan

GESNER, *gĕs'nĕr*, ABRAHAM (1797–1864). A Canadian geologist, born in Nova Scotia He studied medicine in London and took his degree in 1827. Eleven years later he became geologist of the Province of Nova Scotia. In 1846 he

made experiments on burning oil distilled from petroleum and in 1848–51 on asphalt and other natural products from Trinidad The result was the discovery of an illuminating oil capable of being burned in lamps and distilled from cannel coal and bituminous shale To this he gave the name of kerosene, which was later applied to other mineral oils used for illuminating. In 1852–62 he lived in New York City, where he established two extensive manufactories of the oil In the latter year he returned to Halifax, where he died His writings are *Treatise on Coal, Petroleum, and Other Distilled Oils* (1860), *Remarks on the Geology and Mineralogy of Nova Scotia*, and *Geology of New Brunswick and Prince Edward's Island*, articles on "The Gypsum of Nova Scotia," vol v, "Elevations and Depressions of the Earth in North America," vol xvii, and "Petroleum Springs in North America," vol xviii, in the *Journal of the London Geological Society*, and, in its *Proceedings*, vol iv, a "Geological Map of Nova Scotia"

GESNER, Johann Matthias (1691–1761) A distinguished German classical scholar, born at Roth, near Ansbach He studied at the University of Jena, and in 1714 published a work on the *Philopatris* ascribed to Lucian In 1715 he became librarian and associate rector at Weimar; in 1729, rector of the Gymnasium at Ansbach, and in 1730, rector of the St Thomas School at Leipzig, where he was associated with Johann A Ernesti and Johann Sebastian Bach On the foundation of the University of Gottingen he became professor of rhetoric and subsequently librarian also He did much to bring about a revival of the study of Greek in Germany and used his influence to induce the German universities to base their instruction in Greek and Latin on the classical authors He published editions of Quintilian (1738), Pliny the Younger (1739), Claudian (1759), and the *Scriptores Rei Rusticæ* (1735), but his greatest work is the *Novus Linguæ et Eruditionis Romanæ Thesaurus* (1749). Consult· Ernesti, *Narratio de Gesnero* (Leyden, 1762), Sauppe, *Gottinger Professoren* (Gotha, 1872), Pohnert, *J M Gessner und sein Verhaltniss zum Philanthropanismus und Neuhumanismus* (Leipzig, 1898); Sandys, *A History of Classical Scholarship*, vol. iii (Cambridge, 1908)

GESNER, Konrad von (1516–65). A Swiss naturalist, born at Zurich He studied Greek, Latin, Hebrew, and medicine at Zurich, Strassburg, Bourges, Paris, Montpellier, and Basel, at the last place taking his medical degree He returned in 1541 to Zurich as professor of physics and practiced in that city as physician until his death from the plague Gesner collected and described animals and plants with the greatest zeal throughout his entire life and wrote voluminously on many subjects His most important work is *Historia Animalium* (1551–58), in which he intended to describe every known animal The first book treats of viviparous, the second of oviparous quadrupeds, the third of birds, and the fourth of aquatic animals The fifth book, on serpents, and the sixth, on insects, he left incomplete. He was preparing a description of all known plants at the time of his death. Gesner was the most important naturalist of his age He performed the useful work of bringing together all that was known of animals and plants, including those of the recently discovered countries in the New and the Old World, and, although he made no attempt to arrange them in a natural system, his work, together with the similar work of Aldrovandi (q v), formed the basis for the fruitful investigations and generalizations of the two following centuries

GESNERACEÆ, gĕs′nēr-ā′sē-ē (Neo-Lat nom pl, named in honor of Konrad von Gesner) A family of dicotyledonous plants, mostly herbs or shrubs, comprising about 80 genera and nearly 1000 species, natives of tropical and subtropical countries The family is associated with Scrophulariaceæ and Labiatæ, and several other families, to form the great order Tubiflorales, which is the great assemblage of hypogynous Sympetalæ (q v) No representatives of Gesneraceæ are natives of the United States

GESSI, jĕs′sē, Romolo (1829–81) An Italian explorer, born at Ravenna After serving in the Austrian army he was sent as an officer in the service of Egypt to the Sudan, where Gordon employed him to explore the upper Nile and the Albert Nyanza, which he sailed completely around (1876) Accompanied by Matteucci, he tried to enter the country of the Gallas, but without success In 1879–80 he put down the insurrection raised by Suleiman in southern Darfur and became Governor of the Province of Bahr-el-Ghazal After Gordon's resignation Gessi Pasha refused to work under Raouf and resigned (1880) He died at Suez, of malarial fever, May 1, 1881, and left a volume descriptive of his adventures, *Sette anni nel Sudan egiziano* (1891, Eng trans, London, 1892)

GESSLER, gĕs′lēr An Austrian official in the forest cantons of Switzerland, according to traditions connected with William Tell (q v) His oppressive edicts and wanton cruelty so enraged the inhabitants that a conspiracy was formed against him, and he was shot by Tell in a narrow pass near Kussnacht He is a wholly legendary character

GESSNER, gĕs′nēr, Ludwig (1828–90) A German jurist He was born at Axthausen and was educated at Halle, Heidelberg, and Berlin He held important positions in the German ministries of War, State, and Foreign Affairs, and wrote on marine and international law *Das Recht des neutralen Seehandels* (1855), *Le droit des neutres sur mer* (1865, 2d ed, 1876), *Zur Reform des Kriegs-Seerechts* (1875), "Die Staatsvertrage im allgemeinen," in Holtzendorff's *Handbuch des Volkerrechts*, vol. iii (1887)

GESSNER, Salomon (1730–88). A Swiss poet, painter, and etcher, very popular in his day as a writer of prose idyls He was born in Zurich, April 1, 1730 His first noteworthy poem, *Lied eines Schweizers an sein bewaffnetes Madchen* (1751), was followed by the prose poem *Daphnis* (1754), *Idyllen* (1756), and, most famous of all, *Der Tod Abels* (1758), which he called 'a sort of idyllic prose pastoral" Gessner's work is throughout insipidly sweet and monotonously melodious, yet it exactly suited the taste of a generation nursed on Rousseau The idyls had a European influence and appeared in seven languages He died in Zurich, March 2, 1788 Gessner's *Works* were frequently published, last in 1841 There is a French translation in three volumes (1786–93) Gessner's *Life*, by Hottinger, appeared in 1796, his *Correspondence with his Son* in 1801 For Gessner's literary influence, consult Texte, *J J. Rousseau and Literary Cosmopolitanism* (New York, 1897).

GESTA ROMANORUM, jĕs'ta rō'ma-nō'rŭm (Lat, The Deeds of the Romans) The title of one of the most popular collections of anecdotes in the later Middle Ages The stories are written in Latin and supposedly are based on Roman history, though in fact there is very little actual history contained in them Probably at an early date there were collections of stories taken from Roman history and used as illustrations for sermons These stories were then put together for the express purpose of being moralized and finally appeared under the title of *Gesta Romanorum Moralizata,* or something similar Many manuscripts have come down, the three earliest editions we have were printed between 1472 and 1475 and contained altogether 181 stories, which had originated, according to Oesterley, in England at the end of the thirteenth century The stories are short and destitute of rhetorical ornament, and usually have neither dialogue nor tragic incident Their attractiveness lies in their childlike simplicity The stories were very widely read, were translated into many languages, and have been used by many later authors, although not always directly Chaucer, Gower, and others owed considerable to these simple stories Shakespeare's *King Lear* may be based upon one of the tales in the *Gesta Romanorum,* and a part of the *Merchant of Venice* may come from the same source Schiller's *Der Gang nach dem Eisenhammer* and other examples from the German might be given The best critical edition is that of Oesterley, *Gesta Romanorum* (London, 1894) and *Gesta Romanorum,* trans from the Latin by C Swan (2 vols, New York, 1905), which contains a bibliography

GESTATION, jĕs-tā'shŭn (Lat *gestatio,* from *gestare,* frequentative of *gerere,* to carry) The term applied in physiology to the period that intervenes in the mammalia between impregnation and the bringing forth of the young The length of gestation and the number of young produced at a birth vary extremely in different mammals, but usually stand in an inverse ratio to one another Thus, in the larger Herbivora, as, e g, the elephant, the horse, the ox, and the camel, the female seldom produces more than one at a time, but the period of gestation is long, while in the smaller ones the progeny is numerous, but the period of gestation is only a few weeks In the elephant the period of gestation extends over 21 or 22 months, in the giraffe it is 14 months, in the dromedary it is 12 months, in the mare upward of 11 months, in the tapir, between 10 and 11, in the cow, 9, and in many of the larger deer, somewhat more than 8 months In the sheep and goat the period is 5 months In the sow, which produces a numerous litter, the period is 4 months In the Rodentia the progeny is numerous and imperfectly developed, and the period of gestation is comparatively short, in the beaver, one of the largest of the order, it is 4 months, in the rabbit and hare, from 30 to 40 days, in the dormouse, 31 days, in the squirrel and rat, 4 weeks, and in the guinea pig, 3 weeks or less The young of the Carnivora, like the young of the Rodentia, are born with their eyes closed and in a very immature condition, and even in the larger Carnivora the period of gestation is far shorter than in the larger Ruminantia or Pachydermata; it is 6 months in the bear, 108 days in the lion (the period in this animal is stated by Van der Hoeven at 3 months), 79 days in the puma, 62 to 63 days in the dog, the wolf, and the fox, and 55 or 56 days in the cat Of the Marsupialia, gestation in the kangaroo lasts 39 days, in the opossum 26 days Of the Quadrumana, the period of gestation lasts 7 months in the monkey, which bears one, rarely two, young at term Of the Cetacea, the whale's normal pregnancy lasts 10 months Domesticated animals breed oftener than those in a wild condition Wild pigeons breed twice, domesticated pigeons six or more times a year

In women, the accepted period of gestation is 275 days from insemination, or 280 days (on an average) from the last day of the previous menstruation In a young mother the first pregnancy may be much shorter than succeeding pregnancies Prolongation of gestation to 300 days is possible, counting from the last menstrual flow French law admits the legitimacy of a child born 300 days after the separation of the parents, Scottish law allows 10 months, English law allows the lapse of 11 months between the death or departure of the husband and the birth of a legitimate child, in the United States it was decided, in the case of the Commonwealth *v* Hoover, Clark (Pa) 514 (1846), that a child born 313 days after the absence of the father began was not *necessarily* a bastard See BASTARD

GESTE, zhâst, CHANSONS DE See CHANSONS DE GESTE

GES'TURE, GESTURE LANGUAGE A gesture may be defined as an expressive movement, whether mimetic, pantomimic, or attitudinal, which is used to convey some thought or emotion, and we may speak of the whole body of gestures as constituting a gesture language The study of gesture has so far been confined chiefly to mimetic and pantomimic expression, though a beginning has recently been made in the investigation of bodily attitudes (See EXPRESSION, EXPRESSIVE MOVEMENTS) There is much evidence in favor of the view that gesture language is the most primitive, as well as the most natural and universal, of all languages Moreover, it is possible to trace a direct connection between gesture and speech Indeed, since the latter is, fundamentally, movement of the vocal organs, speech may be said to have been originally gesture, the sound being at first purely accessory, and only later becoming the medium of communication But words are far better adapted than gestures to the manifold requirements of language, and particularly to the expression of abstract thought, so that gesture, in civilized races, has largely fallen into abeyance, and its scientific study would scarcely be possible were there not remaining a few instances in which gesture language has retained something of its original value.

The first of these sources of study is the gesture language of the uninstructed deaf-mute The finger alphabet used by instructed deaf-mutes is, of course, not a natural gesture language, it is derived from the written letters, and is a highly artificial product The same thing may be said of any sign language which is intended to conform to a spoken language, such as, e g, that invented by the Abbé Sicard, who attempted to construct a language of signs in which there should be a sign for every word of the spoken language, to the word order of which the gesture order should likewise conform Similarly, the accidental or merely suggestive signs peculiar to families, one member of which happens to be a mute, are likely to

be influenced by other and normal members of the family The most favorable condition for the development of the natural gesture is found in institutions in which a number of mutes are brought together, and in which they are allowed to communicate freely with one another without outside influence Under these circumstances there develops a type of gesture characterized by naturalness and by freedom from convention or tradition

The second form of gesture language is that of the North American Indian Unlike that of the deaf-mute, this language took shape without outside influence, and throughout many generations The Indian possessed in fact two languages, a spoken and a gesture language, the two might be used together or, if circumstances so demanded, either could be employed alone At night, when the gesture could not be seen, speech was chosen, during the day, if on the hunt, or if safety demanded silence, communication was by gesture Since, moreover, the Indians were divided into many races, each one with a spoken language of its own which was incomprehensible to the other, and since races frequently split up into tribes, and a tribe might develop a dialect which presently could not be understood by other tribes of the same race, it came about that, whenever two tribes or races met for trade or treaty, gesture language was resorted to as the common medium of communication Naturally, then, gesture language was of great importance and reached a high degree of development The gestures of the deaf-mute are renewed with every generation, those of the Indian were passed on from one generation to the next—with the result that many of them are now so wholly conventional that the Indian himself cannot explain the relation between the symbol and its meaning

Still a third form of gesture, and one developed under different cultural conditions, is to be found in southern Europe The gesture language of the Neapolitans is the best known It is doubtless of ancient origin, as evidenced by early Latin writers, and by antique works of art in which are depicted gestures similar to those of the present time Gestures may still be seen on the streets of Naples which were used in the days of Augustus The reason for the continued employment of the gesture by these southern Italians is probably twofold Italy has for centuries been flooded with strange languages and dialects, so that gesture serves here, as in the case of the American Indian, to furnish a common language, and again gesture, as a means of expression, is suited to the temperament of the people At all events, the gesture language of the Neapolitans shows the effects of long centuries of convention and tradition, and has reached the highest stages of development

A fourth and last form of gesture language, one which in comparison with the others is purely conventional, occurs in cases where a society for some reason renounces speech and employs another form of communication to take its place An example is found in the sign language of the Cistercian monks who, except in religious exercises, were vowed to silence Since these recluses developed no more signs than were necessary for their daily occupations, their gestures are relatively few in number; but they are sufficient to make possible a comparison with the other forms of gesture language The system is characterized by gestures of two kinds some are "natural," and are therefore similar to the gestures of the uninstructed deaf-mute, others are abitrary and peculiar to the society As a whole, the gesture language of the Cistercians gives the impression of a construction from fragments of natural gestures, and suggests a logical rather than a psychological foundation

We have, therefore, three types of gesture language the natural language of the deaf-mute, which has only a limited range, the more highly developed languages of the Neapolitan and of the American Indian, which show the influence of tradition, and, finally, the relatively artificial language of the Cistercian monks All, however, are alike in that they have the natural gesture as a starting point, the differences result from manner of growth or of expansion The Indian would have little trouble in understanding the deaf-mute, but he could comprehend the gestures of the Neapolitan only in part, on the other hand, he would learn the conventional gestures of the Neapolitan much more easily than the artificial gestures of the Cistercian, because the former have a more directly psychological origin

From all this it is clear that in gesture language the various dialects, if we may so distinguish the different developmental forms, rather reflect differences of social condition and tradition than illustrate the kind of variation which is shown by ordinary speech The question arises, then, as to the possibility of an etymology of gesture which shall be comparable with that of speech We may, evidently, refer a given sign to some other and original gesture whenever in the course of social evolution the sign or its meaning has undergone some demonstrable change In so far the two etymologies are comparable, but in other respects the etymology of gesture is essentially different from that of speech The latter ends when the "root" is discovered, but in gesture the search really begins when the original gesture is known, we must seek to explain the psychological meaning of this gesture and to determine its place among the expressive movements Now, the two fundamental forms of gesture are the demonstrative and the representative, and these are also the fundamental forms of expressive movements The demonstrative form has, in its evolution from expression of feeling to gesture language, remained essentially unchanged The representative form, however, divides first into two subforms the depictive, which is purely imitative, and the characteristic, which is more free and more artistic. Later, a third subform appears, derived from the others, which we may designate as the symbolic

The great antiquity of the demonstrative gesture is grounded in the psychological conditions of its origin When the object concerning which communication is to be made lies in the visual field, the use of the forefinger in pointing is the simplest, the most certain, and the most unequivocal means of calling attention to it, a means employed without reflection, out of the immediate intent to communicate The child uses it for the first beginnings of communication, and it is fundamental to every type of gesture language The pointing gesture serves to indicate not only objects, but also persons and spatial relations, if the person com-

municating wishes to indicate himself, he points to the pit of his stomach, he designates "you" by pointing to the person addressed, while the spatial ideas "up," "down," "right," "left," "back," and "front" are all indicated by pointing in the appropriate directions Later the personal gesture is expanded to indicate parts and functions of the body, "eye" is suggested by pointing to that part, and "seeing" is suggested by first pointing to the eye and then making a pointing movement outward into space Later also develop the demonstrative gestures for the size of objects, the right hand held out flat with the palm down, and then raised towards the level of the shoulder, signifies "great", if the hand is depressed, the gesture means "small" Finally, a spatial gesture is made to serve symbolically for a temporal idea, thus, pointing forward means "future," and pointing backward signifies "past" The developed forms of the demonstrative gesture tend to pass over into the representative form Thus, if the object of conversation is not present, some attribute of it may be pointed out in another object which is present, or recourse may be had to characterization "red" is indicated by pointing to the lips, and the Cistercian signifies "wine" by touching his nose

The representative gestures are simply a further development of the imitative expressive movements, and of their two forms, the depictive and the characteristic, the former always remains purely imitative The depictive gesture, again, appears in two varieties the delineating, which may be described as "drawing a picture in the air", and the plastic, so called because the plasticity of the hand permits the imitation of solid objects The delineating is the earlier type, it predominates in the natural gesture language of the deaf-mute, while in later development the hand makes quick plastic movements to represent moving objects To illustrate the deaf-mute represents "house" by placing the two open hands together, tip to tip and at right angles, thus making a roof and gable, the Cistercian signifies "church" by first making the sign for house, and then making the sign of the cross above the roof The gesture for "room" is the drawing of a rectangle in the air, and an "inclosure" is a circle, to represent "garden" the circle is first drawn and then the thumb and forefinger are held to the nose as in the act of smelling a flower "Smoke" is an upward spiral movement of the forefinger to represent the rising clouds of smoke, if the smoke rises from a house, the gesture for smoke is added to that for house The sign for "rain" is a plastic gesture made by holding up the two limp hands with the fingers pointing down Mimetic movements are sometimes combined with delineating gestures, e g, "sleep" is suggested by placing the head, with eyes closed, on the right hand, "death" is the gesture for sleep followed by a pointing sign to the ground The "characteristic" form of the representative gesture reproduces only some attribute or aspect of the object Thus, the deaf-mute gesture for "woman" is the hand placed upon the breast, that for "child" is made by rocking the right elbow in the hollow of the left hand, another and very old gesture for "child" is produced by placing the forefinger in the mouth, this is supposed to signify either sucking or silence The use of mimetic in connection with plastic characteristic gestures also appears, e g, the pursed lips, with forefinger held up, indicate "be still" or "warning"

At its highest development the gesture becomes symbolic As a symbol, however, it differs from the word, in that the latter symbolizes both concrete and abstract ideas, while the gesture symbolizes only abstract ideas Furthermore, the word has always been a symbol, the gesture becomes a symbol only as the result of evolution In many cases this evolution may easily be traced We have already seen that the pointing gesture, which at first was used to indicate objects in the field of vision, later came to designate spatial relations, and still later temporal ideas, and it is also evident that as the representative gesture becomes characteristic it is tending in the direction of the symbolic A complete development of this sort is seen in a Neapolitan gesture which originally meant "bull" The gesture is produced by extending the first and fourth fingers while the two middle fingers are held down by the thumb, the hand thus represents the horned head of the "bull" Later, however, this gesture came to mean "strength," the principal characteristic of the bull, still later it was employed to symbolize "danger," and finally to express the wish "to be protected from danger" But not all symbolic gestures are derived in this way, the original gesture may itself be changed to express an abstract idea Thus the gesture for "to talk" or "to speak" is made by first touching the lips with the index finger, and then pointing out into space If, now, this movement is straight forward, it signifies "straight talk" or "truth", the gesture, as yet unchanged, has become symbolic When, however, it is desired to express "untruth" or "lie," the line of movement from the lips is no more straight forward, but oblique Mimetic movements are also combined with pantomimic in symbolic gestures, a Neapolitan gesture of this kind is that showing "mistrust," although it originally meant "warning" or "have a care" The gesture consists in drawing down the lower lid of the left eye, as if to say to the person upon whom the gaze is directed, "keep your eyes open" The facial expression of strained attention intensifies the gesture, or if the expression be that of a smile or laughter, the meaning changes to that of slyness or craftiness

So much must suffice for the classification and analysis of gesture language It now remains to discuss its grammar and syntax As regards the former, we may say roundly that gesture language has no grammar, there are no nouns, verbs, prepositions, or articles, no adjectives or connectives, no nominative, accusative, or dative cases The same gesture may be made to fit into any one of a number of grammatical categories. For example, the gesture for "lie" does duty for "a lie," "to lie," "lying," and "lied", and the sign for "sleep" may be subject or object, verb or adjective, present, past, or future tense It is clear, on the other hand, that a gesture may be used in the logical sense as subject, object, verb, or adjective, and that in a series of gestures, corresponding to a sentence in speech, we may regard one gesture as subject, another as object, etc An examination of gesture narrative from this point of view shows that the syntax of gesture is governed by a single principle, every gesture must be intelligible either in itself or by reference to the preceding gesture.

From this principle it follows (1) that the subject precedes attribute, and (2) that the object precedes action If, then, the deaf-mute desires to express the ideas contained in the sentence "The angry teacher struck the child," he will first make the gesture for "teacher," then that for "angry," then that for 'child," and finally the sign for "struck"—"teacher, angry, child, struck" Save in certain limiting cases these two orders are sufficient for any demand of syntax which may be laid upon the gesture language

Consult Tylor, *Anthropology* (New York, 1889), *Researches into the Early History of Mankind* (Boston, 1878), Wundt, *Volkerpsychologie* (Leipzig, 1911), *Elemente der Volkerpsychologie* (ib, 1913), Mallery, "Sign Language (Philadelphia, 1885), Sittl, *Die Gebarden Annual Report of the Bureau of Ethnology* (Washington, 1879–80), Jorio, *La mimica degli antichi investigata nel gestire Napoletano* (Naples, 1832), Clark, *The Indian Sign Language* (Philadelphia, 1885), Sittl, *Die Gebarden der Griechen und Romer* (Leipzig, 1890), Hacks, *Le geste* (Paris, 1892), Harmand Dammien, *L'Art de se faire écouter La diction et le geste* (ib, 1902) See EXPRESSION, SIGN LANGUAGE

GETA, jē'ta, SEPTIMIUS (189–212 A D.) A son of Septimius Severus and brother and colleague of Caracalla Upon his father's death he was proclaimed Emperor, with Caracalla, but in the following year was murdered by centurions at the instigation of his brother

GETÆ, jē'tē (Lat, from Gk Γέται, *Getai*) An ancient warlike people, closely akin to the Daci (see DACIA), who figure in the wars of the Greeks and the Romans. At the dawn of history they inhabited the country which is now called Bulgaria Here Darius Hystaspis encountered them in his Scythian expedition Shortly before the time of Alexander the Great, who warred with them, the bulk of the nation had migrated northward across the Danube. They spread over a wide region, extending from the Black Sea to the plains of Hungary The Getæ south of the Danube, in Mœsia, were united in a powerful realm in the time of Cæsar, but this state had only an ephemeral duration, the Roman power becoming supreme in these regions The Getæ, as an independent people, disappear from history about the close of the first century A D At the time of the great migration of nations they appear to have been absorbed by the Goths, with whom they came to be erroneously identified The Getæ are often mentioned in the literature of the Augustan era as savage and unconquerable foes

GETHSEMANE, gĕth-sĕm'a-nē (Aramaic, from *gath*, a wine press + *shemen*, oil) A small farm or estate on the Mount of Olives, about ¾ of a mile from Jerusalem, and separated from it by the Kedron valley Attached to it was a garden, or orchard, a favorite resort of Jesus and His disciples (Luke xxii 39, John xviii 1, 2), and the scene of the agony on the night before His passion (Matt xxvi 36–47; Mark xiv. 26–42, Luke xxii 39–46) The spot pointed out to modern travelers as the site of Gethsemane is admitted to be near the real location, although some think it too near Jerusalem to be Gethsemane itself. It is a place about 150 by 140 feet, inclosed by a stone wall, and contains eight very old olive trees, which are popularly supposed to have existed in the time of Jesus, though they cannot be traced farther back than the sixteenth century. The garden was given its present form by the Franciscans in 1848, but a "Grotto of the Agony" is shown a little distance to the north, and is reached by a passage from the forecourt of the church of the Virgin's Tomb The tradition is quite continuous back to the time of the Bordeaux pilgrim (333 A D) and Eusebius Consult Conder, *Bible Places* (London, 1897), Thomson, *The Land and the Book*, vol ii (New York, 1880–81), Sanday, *Sacred Sites of the Gospels* (Oxford, 1903), George Adam Smith, *Jerusalem* (London, 1908)

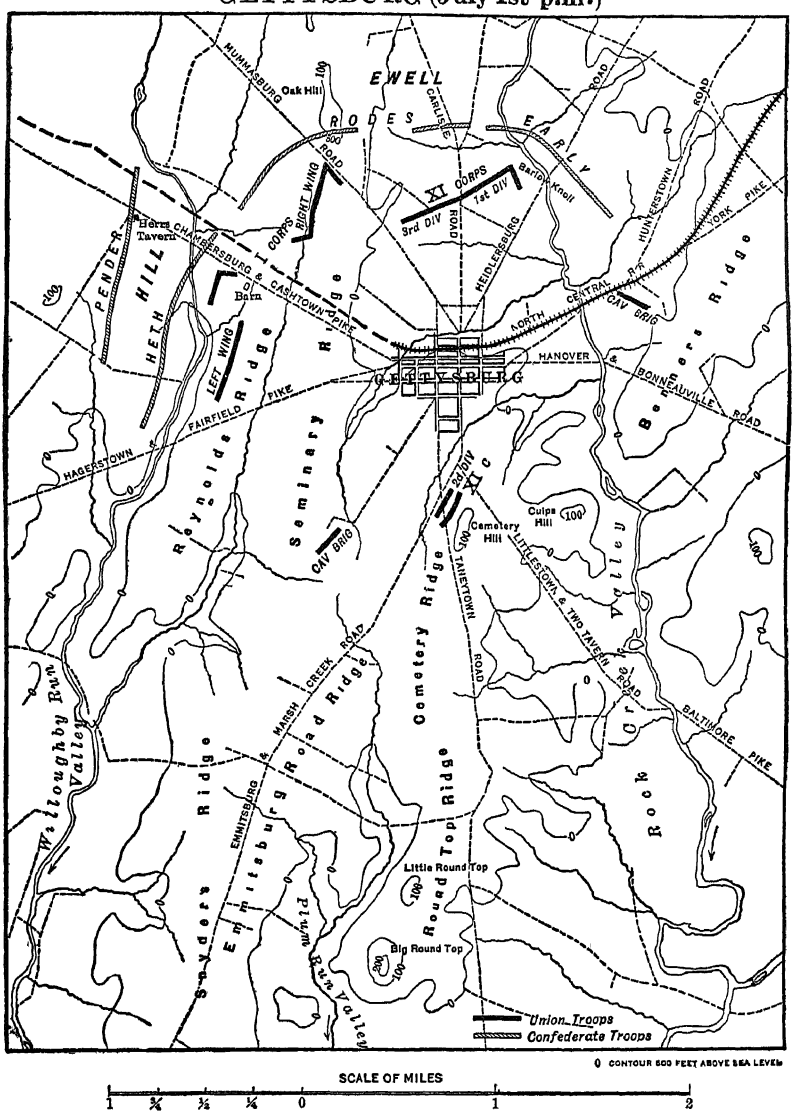
GETTY, gĕt'tĭ, GEORGE WASHINGTON (1819–1901) An American soldier, born in Georgetown, D C Upon graduation at West Point in 1840 (with Sherman and Thomas), he was commissioned second lieutenant in the Fourth Artillery He served on the frontier during the Canadian border troubles, and, with rank of brevet captain for gallantry at Contreras and Churubusco, fought in the Mexican War In the Civil War he served with the Army of the Potomac in the Virginia Peninsular campaign, and from the siege of Petersburg to the Confederate surrender at Appomattox, and rose to the rank of brevet major general of volunteers for services at Winchester and Fisher's Hill In 1866 he became colonel of the Thirty-seventh Infantry, in 1877 commanded forces on the Baltimore and Ohio Railway strike, was a member of the Fitz John Porter court of inquiry, in 1882 was transferred to the Fourth Artillery, and in 1883 was retired

GETTYSBURG, gĕt'tĭz-bûrg A borough and the county seat of Adams Co, Pa, 35 miles (direct) southwest of Harrisburg, on the Western Maryland and the Gettysburg and Harrisburg railroads (Map Pennsylvania, G 8) It is situated among picturesque hills in a fertile agricultural country and is the seat of a Lutheran theological seminary, founded in 1826, and of Pennsylvania (Gettysburg) College (Lutheran), organized in 1832 The industrial establishments comprise shirt, furniture, and wrapper factories, a brick plant, planing mills, and a foundry The borough is governed under a charter of 1853, which provides for a burgess, elected every three years, and a unicameral council Pop, 1900, 3495, 1910, 4030 Laid out in 1780, Gettysburg (named after Gen James Gettys, its founder) was made the county seat in 1800 and was incorporated as a borough in 1806. One of the most noted battles of the Civil War was fought here, July 1–3, 1863, a Federal army under General Meade defeating the Confederates under General Lee (See GETTYSBURG, BATTLE OF) The entire battlefield has been included in a national park, the sites of particular actions being marked by monuments, of which there are now over 500 On Cemetery Hill stands the National Cemetery, 17 acres in area, dedicated by President Lincoln on Nov 19, 1863 In it there are 3629 graves, 1630 of unknown dead. From the brow of the hill rises a battle monument surmounted by a statue of Liberty and with typical basal figures of War, Peace, History, and Plenty

GETTYSBURG, BATTLE OF The most important and most hotly contested battle of the Civil War in America, fought July 1–3, 1863, at Gettysburg, Pa, between the Federal Army of the Potomac, numbering about 82,000 men, under General Meade, and the Confederate Army of Northern Virginia, numbering about 73,000 men, under General Lee After the battle of Chancel-

lorsville (May 2–4) the two armies stood for some weeks facing each other across the Rappahannock at Fredericksburg, Va, General Lee taking advantage of the interval to reorganize his army and divide it into three corps, each of three divisions, which he placed under Longstreet, Ewell, and A P Hill respectively This accomplished, and his army being sufficiently rested, he decided upon the invasion of Pennsylvania, hoping by this bold plan to draw Hooker, where he threatened Harrisburg Hooker followed along the east bank of the Rappahannock about the middle of June, and on the 25th and 26th crossed the Potomac at Edwards Ferry On the 28th he was superseded as commander of the Army of the Potomac by General Meade, who soon selected a field of battle along Pipe Creek, on which, if possible, to concentrate his forces and meet the Confederate army On the afternoon of June 30, however, Buford, with a

GETTYSBURG (July 1st p.m.)

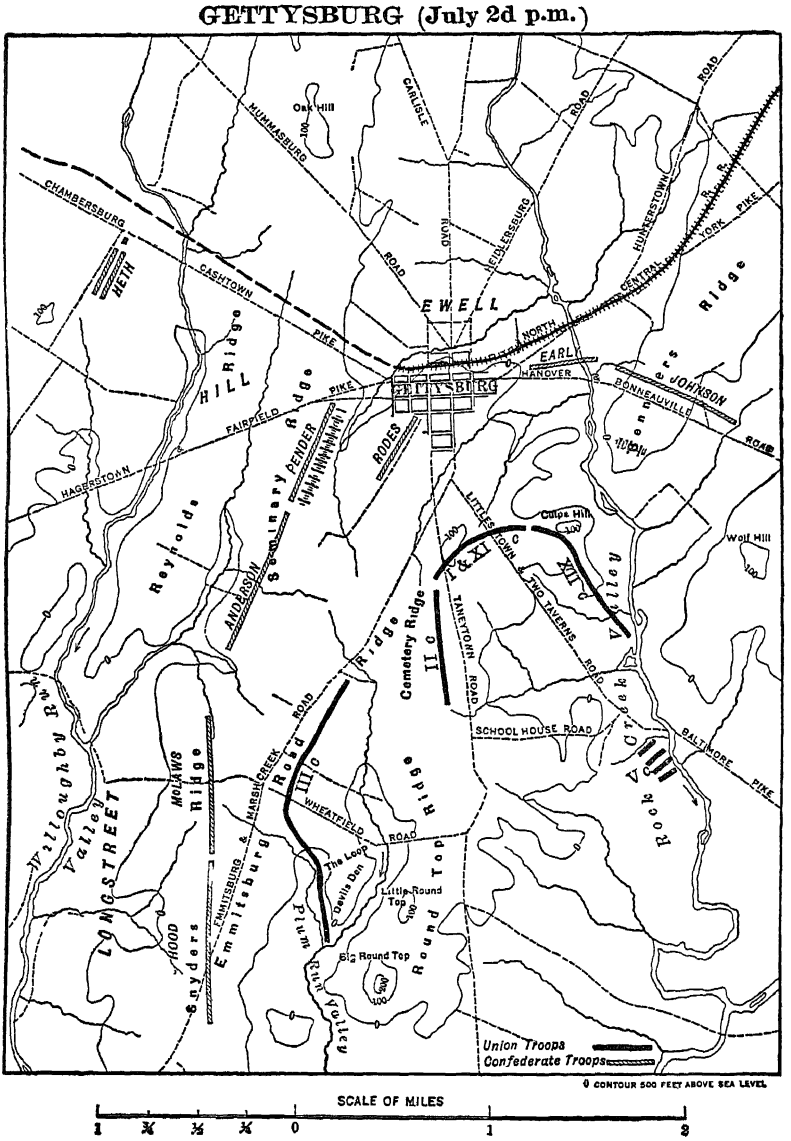


then commanding the Army of the Potomac, in pursuit, to defeat the Federal army on Northern soil, to threaten and perhaps capture Washington, to secure the support or at least recognition of France and England, and to bring the war to a close, forcing from the North a recognition of the independence of the Confederacy. On June 3 he began to move, and by June 26 each of the three corps had crossed the Potomac into western Maryland, Ewell having passed over about 10 days earlier and having entered Pennsylvania, force of Federal cavalry, occupied McPherson's Ridge, beyond Seminary Ridge, west of Gettysburg, and here, at about eight o'clock on the following morning, he came in contact with Heth's division of Hill's Confederate corps, the whole Confederate army having been ordered by General Lee to concentrate at Gettysburg Though considerably outnumbered, he stubbornly held his ground for two hours, until the arrival of General Reynolds at the head of the First Corps of the Federal army, which was reenforced about

1 P M by the Eleventh Corps under General Howard, the Federal troops now occupying ground north as well as west of Gettysburg

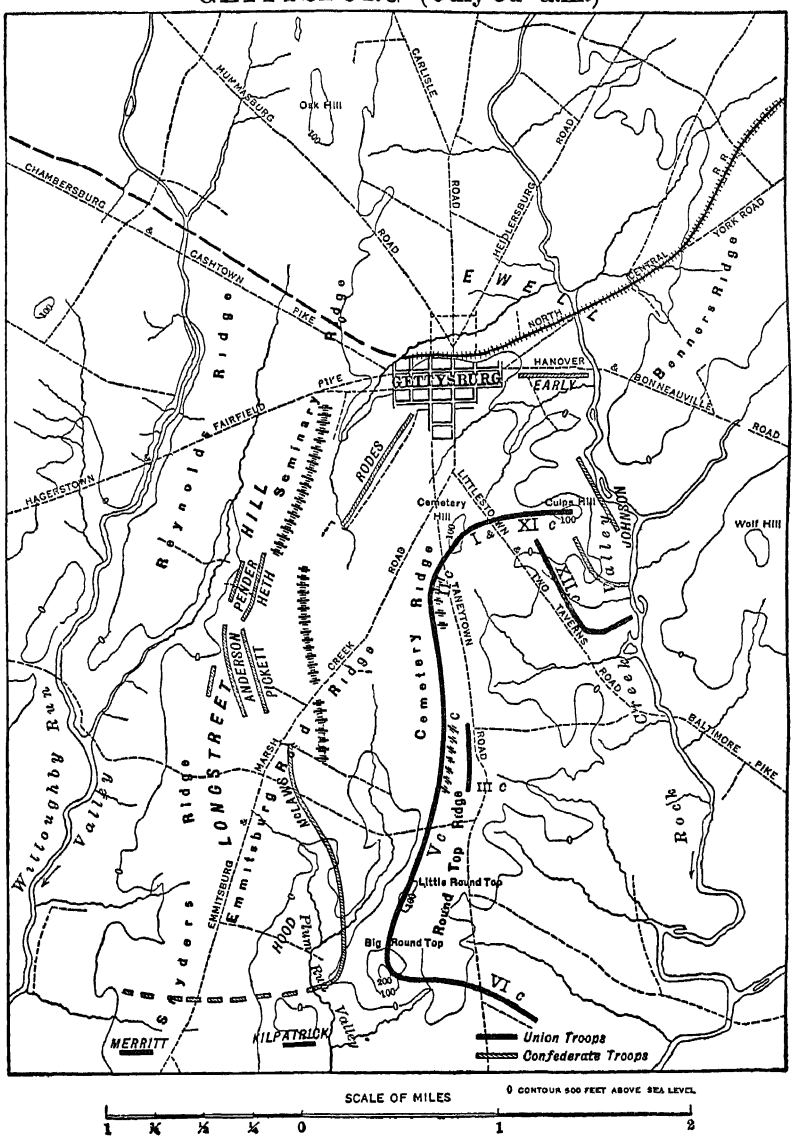
At about one o'clock, also, General Ewell arrived with a part of his corps, the rest coming up during the afternoon, and took command on the Confederate side At about 4 P M the Confederates advanced, drove the Federals from the field, and occupied the ground thus vacated The Federals, under Hancock, who had superseded Howard by Meade's orders about 3 30 P M, took up a strong position on Cemetery Ridge and Culp's Hill (south and southeast of Gettysburg), which they quickly fortified Both sides had suffered heavily during the day in killed and wounded, and the Confederates took several thousand prisoners The Federals sustained their severest loss in the death of General Reynolds, who was killed instantly by a Confederate sharpshooter late in the morning Thereafter until the arrival of General Howard, General Doubleday had been in command During the night and the following day almost the whole of each army was brought upon the field, though Pickett's division of Longstreet's corps did not arrive until towards night on the 2d The Federal position formed a long convex line, beginning at Culp's Hill and ending at Round Top, General Sickles, with the Third Corps, occupying ground somewhat in advance and to the north of Little Round Top, his line following roughly the angle formed by the junction of the Emmitsburg Road and the cross-road leading therefrom to the Taneytown Road, east of the Federal position, and being "refused" towards Devil's Den At the crossing there was a peach orchard, and between the crossing and the ridge along which the Federals were intrenched there was a wood north of the road and a wheat field south of it The Confederate position, on the other hand, formed a much longer

GETTYSBURG (July 2d p.m.)


EWELL
EARL
HANCOCK
SICKLES
SLOCUM
GETTYSBURG
Oak Hill
Culps Hill
Wolf Hill
Cemetery Ridge
Round Top
Little Round Top
Big Round Top
The Loop
Devils Den
Plum Run Valley
Rock Creek
Valley
Emmitsburg
Snyders
Longstreet
Valley
Willoughby Run
Reynolds
Hill
Ridge
Seminary Ridge
Rodes
Pender
Anderson
Johnson
Ewell
Hill
Ridge
Hill
Ridge
Hill
Ridge

and thinner concave line, with Longstreet in command on the right, A P Hill in the centre, and Ewell on the left Lee, against the emphatic advice of Longstreet, who wished to manœuvre the Federals out of their position and interpose the Confederate army between Meade and Washington, resolved to attack, and issued orders, accordingly, to Longstreet on the right and Ewell on the left, the former being expected to make the principal assault The operations on the right did not begin until about 4 P M on July 2, though, according to many Southern writers, Longstreet should have delivered his attack early in the morning, when there would have been a much greater chance of Confederate success. When made, however, the attack was vigorous and spirited, and after a fierce conflict the angle at the peach orchard was broken in, and the Federals were forced to abandon their advanced position and fall back upon their main line, along Cemetery Ridge The Confederates, however, were unable to carry Round Top and Little Round Top, the points of greatest strategic value on the Federal left During the engagement Sickles was wounded, and General Meade added the Third Corps to the command of General Hancock In the defense of Little Round Top, which Warren had caused to be occupied in time to repel the Confederate attack, two able Federal generals, Weed and Hazlett, were killed, and another, Vincent, was mortally wounded On each side the losses were exceedingly heavy Late in the afternoon, after an artillery duel lasting about an hour, Early and Johnson, both of Ewell's corps, led their divisions against the Federal right, Early assaulting Cemetery Hill and Johnson Culp's Hill Early, with whom Rodes, commanding the other division of Ewell's corps, failed properly to cooperate, attacked with great vigor and succeeded in

GETTYSBURG (July 3d a.m.)



breaking a line of infantry on the slopes and overrunning the Eleventh Corps and Rickett's reserve batteries, but was finally driven back, the Federals at this point thus preserving the integrity of their line Meanwhile Johnson had met with more success at Culp's Hill, whose defenders had been greatly reduced in number in order to reenforce Sickles on the Federal left, and gained a substantial foothold, which he held overnight, but from which he was driven before noon on the following day

On the night of the 2d Meade held a council of war, in which it was decided to hold the Federal army in the position then occupied and await further attack On the morning of the 3d Lee ordered Longstreet to send Pickett forward to assault the Federal centre as soon as the Confederate artillery should have silenced or noticeably weakened the artillery on the other side At 1 P M began a terrific artillery duel, the Confederates concentrating most of their fire from about 150 guns on Cemetery Ridge, and the Federals answering with about 70 guns, under the direction of Gen. Henry J. Hunt, chief of artillery in the Army of the Potomac After about an hour and a half the Federal artillery, though not seriously damaged, ceased firing to save ammunition and prepare for the Confederate attack This silence being misconstrued by the Confederate officers, Pickett's division, numbering altogether about 5000, moved forward, supported on the right by Wilcox, with about 5000 men, and on the left by Pettigrew, also with about 5000, to attack the Federal centre on Cemetery Ridge, under the immediate command of General Hancock The charge was one of the most magnificent known in military history. Advancing steadily in three columns, in face of a destructive artillery fire, the Confederates promptly filled up the great gaps cut into their lines by the Federal shells, and encountered unflinchingly, after they had passed beyond the Emmitsburg Road, a terrific fire of canister and an enfilading cannonade from a battery on Little Round Top When within about 300 yards of the Federal line, they met the musketry fire of the Federal infantry, which had been previously withheld Pettigrew's advance was utterly demoralized, while Wilcox dropped behind, veering, somewhat bewildered, to the right Pickett's men, nevertheless, pressed on, and in a hand-to-hand conflict carried the first Federal line, but were soon driven back and were finally forced in rapid retreat, their ranks being enveloped by pursuing Federals, back to the Confederate lines As many as two-thirds of Pickett's immediate command, according to some writers, were killed, wounded, or captured. Of his three brigade commanders, Garnett was instantly killed, Armistead, who had penetrated farthest, was mortally wounded; and Kemper was severely injured. On the Federal side, General Hancock was badly wounded, and many able officers were killed. Meanwhile, on the Federal right, Gregg defeated the Confederate General Stuart in a spirited cavalry engagement, and on the Federal left, General Farnsworth was killed, while making a cavalry charge, under General Kilpatrick's orders, against Longstreet's advanced skirmishers Both armies rested during the 4th, but on the ensuing night, under cover of the darkness and a heavy rain, Lee began his retreat towards the Potomac, which he crossed on the night of the 13th, without having been attacked by the pursuing Federal army During the three days' battle the Federal army lost 3072 killed, 14,497 wounded, and 5434 captured or missing, the Confederate army, according to official reports, which, however, have been called in question, 2592 killed, 12,709 wounded, and 5150 captured or missing The battle has been regarded as the turning point of the Civil War

Consult Official Records, vol xxvii, parts i, ii, and iii, Johnson and Buel, *Battles and Leaders of the Civil War*, vol iii (New York, 1887). Doubleday, *Chancellorsville and Gettysburg* (ib, 1882), Comte de Paris, *Battle of Gettysburg* (new ed, Philadelphia, 1912), id, *History of the Civil War in America*, vol iii (ib, 1875–88), Drake, *Battle of Gettysburg* (Boston, 1891), a popular account, Longstreet, *From Manassas to Appomattox* (Philadelphia, 1896), Swinton, *Twelve Decisive Battles of the War* (New York, 1867), Pennypacker, *General Meade* (ib, 1901), Bache, *Life of General George Gordon Meade* (Philadelphia, 1897), Long, *Memoirs of Robert E. Lee His Military and Personal History* (New York, 1886), White, *Robert E Lee and the Southern Confederacy* (ib, 1897), Walker, *General Hancock* (ib, 1894), Nicolay and Hay, *Abraham Lincoln A History*, vol vii (ib, 1890), Goodnow, 'The Battle of Gettysburg," in the *Annual Report of the American Historical Association for 1895* (Washington, 1896), Alexander, *Military Memoirs of a Confederate* (New York, 1907), Steele, *American Campaigns* (Washington, 1909), Ropes, *The Story of the Civil War*, part iii (New York, 1913)

GEULINCX, gē'lĭnks, *Fr pron.* zhē'lăNks', ARNOLD (1625–69) A Dutch philosopher He was born at Antwerp, studied theology and philosophy at Louvain, and afterward remained 12 years as a successful lecturer and teacher of the classics and the Cartesian philosophy For some reason not certainly known, but supposed to have had connection with his intended marriage and his attacks upon scholasticism, he was compelled in 1658 to leave Louvain and went to Leyden, where he became a Protestant, was married, endured many hardships due to poverty, and in 1665 was helped by an influential friend to the position of extraordinary professor in the university. Entering into this work with great zeal, he continued in it until his death He was distinguished among the followers of Descartes, and his writings contain germs of thought that were independently developed by Spinoza and Malebranche He gave special attention to the doctrine of the relation between the soul and the body Descartes had already so separated extension and thought that only in the teeth of logic could he maintain against Gassendi the possibility of any interaction between them. Geulincx was more consistent Accepting from Descartes this separation, he maintained that interaction was impossible, for one cannot be the author of any state of which one is unconscious, for man's very nature is consciousness But a man is not conscious of the mechanism by which bodily motion is produced, hence he is not the author of bodily motion Body and mind are like two clocks which act together, because at each instant they are adjusted by God A physical occurrence is but the occasion on which God excites in the soul a corresponding mental state Geulincx thus originated the theory of occasional causes (See OCCASIONALISM) But this theory compelled a further advance. God, who is the cause of the union of body and mind, is the sole cause in the universe. No fact

contains in itself the ground of any other The existence of the facts is due to God, their sequence and coexistence are also due to Him He is the ground of all that is Apart from God the finite being has no reality In this Geulincx led the way for Spinoza This occasionalistic view, carried out consistently, of course leads to the doctrine that we cannot know extended reality directly, but have merely an idea of it, occasioned in us by God Geulincx's main works were *De Virtute et Primis ejus Proprietatibus* (1665, 10 years later a posthumous edition appeared under the title Γνῶθι σεαυτόν), *Logica suis fundamentis restituta* (1662), *Methodus Inveniendi Argumenta* (1663), *Metaphysica Vera et ad Mentem Peripateticam* (1691) A complete edition of his works in three volumes has recently been published by Land (The Hague, 1891–93) Consult Grimm, *Arnold Geulincx' Erkenntnisstheorie und Occasionalismus* (Jena, 1875), Land, *Arnold Geulincx und seine Philosophie* (The Hague, 1895), Pfleiderer, *Arnold Geulincx als Hauptvertreter der occasionalistischen Metaphysik und Ethik* (Tubingen, 1882), Van de Haeghen, *Geulincx Etude sur sa vie, sa philosophie et ses ouvrages* (Ghent, 1886), also the histories of philosophy by Windelband, Hoffding, and Falckenberg

GEUM, jē'ŭm (Lat, herb bennet, avens). A genus of plants of the family Rosaceæ Two species are common natives of Great Britain and also found in the United States, common avens, or herb bennet (*Geum urbanum*), an herb about 1 to 2 feet high, and water avens (*Geum rivale*), about 1 foot high. Both of these species have the radical leaves interruptedly pinnate and lyrate and the cauline leaves ternate, but *Geum urbanum* has erect yellow flowers, and *Geum rivale* has nodding flowers of a purplish hue The former grows in hedges and thickets, the latter in wet meadows and woods and sometimes even in alpine situations. Both are aromatic, tonic, and astringent, and are employed to restrain mucous discharges and in cases of dysentery and intermittent fever. The root of *Geum rivale* is used also in diseases of the bladder The root of *Geum urbanum* has when fresh a clovelike taste and is used to flavor ale, for this purpose it is gathered in spring before the stem grows up *Geum rivale* is a common plant in the United States as far west as Missouri. The chocolate root (*Geum strictum*) of North America has some reputation as a mild tonic It was once employed in the United States in diseases of the bladder It much resembles the British species in its leaves and has erect flowers, like those of *Geum urbanum.* Many of the species are very hardy and are used in ornamental plantings One group has plumose styles that are very attractive after the petals have fallen *Geum chiloense,* a native of Chile, is one of the best of this class The genus is mainly represented in the cooler regions of the two hemispheres

GEVAERT, ge-vart', FRANÇOIS AUGUSTE (1828–1908) One of the foremost of musical savants. He was born at Huysse (Belgium), and received his first musical education at the Conservatory of Ghent He became organist of the Jesuit church there (1847) In the same year he won the Grand Prix de Rome (q.v.), but received permission to postpone his journey for two years In 1849 he began his career as an operatic composer, writing in all 12 operas He traveled and studied in Italy, Spain, and Germany (1850–52) In 1853 he settled in Paris, where he lived until 1871 (after 1867 as the director of the Grand Opera) In 1871 he succeeded Fétis (q v) as director of the Conservatory at Brussels From this time on he devoted himself to research work on the history of music His first literary work was *Leerboek van den Gregoriaenschen zang* (1856) In 1863 appeared *Traité d'instrumentation,* completely rewritten in 1885 This is now the recognized standard (Ger trans by Riemann, 1887) Gevaert's other important works are *Histoire et théorie de la musique de l'antiquité* (1875–81), *Cours complet de l'orchestration* (1890), *Les origines du chant liturgique* (1890), in which he attacks with weighty arguments the tradition of Gregory I (See PLAIN CHANT) A continuation of this is *La mélopée antique de l'église latine* (1895) He wrote, with Vollgraff, *Les problèmes musicaux d'Aristote* (1899–1902).

GEVELSBERG, gā'vels-bĕrk A town in the Prussian Province of Westphalia, 28 miles east by north of Dusseldorf It has several fine monuments to Kaiser William I and Frederick III It manufactures iron and steel wares, hearths, gas stoves, screws, and machinery Pop, 1900, 13,499, 1910, 18,938

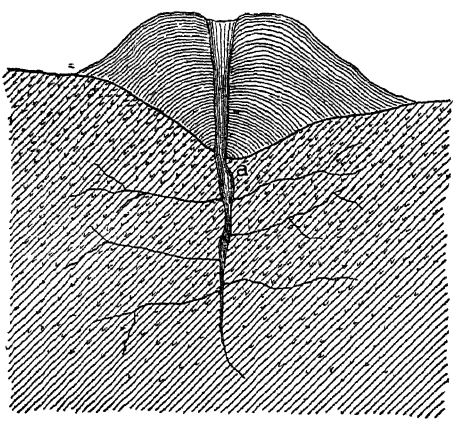
GEWANDHAUS-CONCERTE, ge-vant'hous kŏn-tsĕr'te The name of a famous concert institute in Leipzig The word *Gewandhaus* signifies a cloth merchants' hall, and these concerts were so called because, for want of a suitable hall, they were held in such a building Their beginning dates back to 1743, when Doles began a series of subscription concerts which he continued until 1756, when they were interrupted by the Seven Years' War J A Hiller revived the concerts in 1762 under the name of *Liebhaberkonzerte.* The orchestra, which originally consisted of but 16 performers, was increased to 30. In 1781 the burgomaster Karl Muller, together with 11 others, organized a board of directors and opened subscriptions for a series of 24 concerts to be given every season At present the orchestra consists of about 70 performers, and 20 regular subscription concerts are given Besides these, two benefit concerts are arranged annually—one for the orchestra pension fund, the other for the poor When, in 1835, Mendelssohn assumed the conductorship of the Gewandhaus concerts, they soon rose to such fame and importance that for a time Leipzig was the centre of music not only of Germany, but of all Europe Among the eminent conductors have been Doles, J. A. Hiller, Mendelssohn, F Hiller, Gade, Rietz, Reinecke, Nikisch Consult E. Kneschke, *Die 150jährige Geschichte der Leipziger Gewandhaus-Konzerte* (Leipzig, 1893)

GEYIKLAR See DINEIR

GEYSER, gī'zĕr (Icel *Geysir,* name of a famous hot spring in Iceland, from *geysa, gjõsa,* to gush) An eruptive thermal spring A true geyser has an underground passage communicating with a source of water supply and usually terminating at the surface in a basin built up by a deposition of sinter From the surface vent eruptions of hot water accompanied by subterranean rumblings take place at more or less regular intervals In the powerful outbursts the water is shot upward with a loud roar to a height of 100 feet or more, this display continues for a brief time and then subsides until the next period of activity The occurrence of geysers is limited to regions of recent volcanic activity, where hot springs and mud

springs are accompanying phenomena The geysers of Iceland have been known for many centuries, while those of Yellowstone Park and of North Island, New Zealand, were discovered only in the last century The most prominent examples in Iceland are the Great Geyser, the Little Geyser, and the Strokhr, the first has a pipe nearly 10 feet in diameter and erupts at intervals of a day or more, hurling the water like an immense fountain to a height exceeding 100 feet In Yellowstone Park there are at least 70 eruptive geysers, and nearly 3000 vents of mud volcanoes, fumaroles, and hot springs, most of which occur in four basins The surface is covered with terraces and elevations surrounding the openings, beautifully ornamented with snowy deposits of silica Among the most remarkable of these geysers are the Giant, which throws a column of water 5 feet in diameter to a height of 200 feet, playing continuously for an hour and a half, Old Faithful, which spouts with great regularity every 65 minutes, sending the water to a height of 125 feet, Castle Geyser, issuing from a chimney 12 feet high, Excelsior, which has a basin 200 feet in diameter and spouts at intervals of eight years, the Giantess, which is said to throw a column 20 feet in diameter, the Beehive, and the Grand Geyser The terraces of Rotomahana, New Zealand, once rivaling those of Yellowstone Park, were destroyed by a volcanic eruption in 1886

The investigations of Bunsen in the geyser region of Iceland, confirmed as they were by laboratory experiment, have been generally accepted by geologists as affording a satisfactory



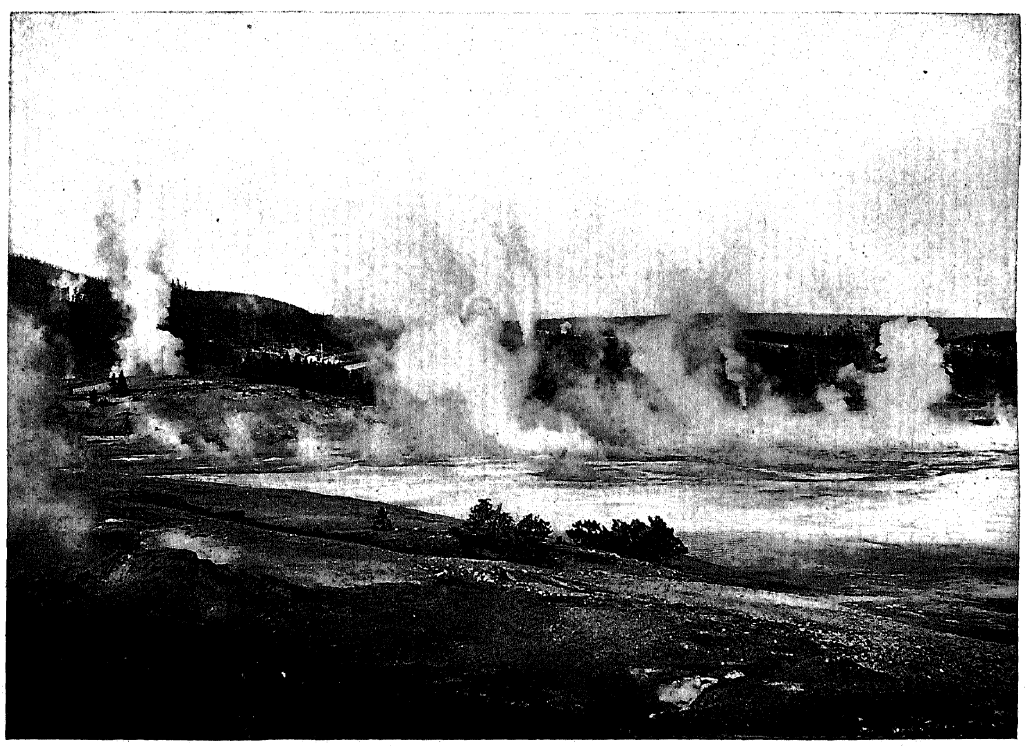
SECTION OF GEYSER

explanation of the origin and activity of eruptive thermal springs By seepage from the surface the geyser tube (*a*) is filled with a column of water, which at a considerable depth receives heat from buried lava flows or other volcanic sources When the temperature in the lower part of the tube is raised to such a point that the water boils in spite of the superincumbent column, a portion of the water is changed into steam and by expansion causes an overflow at the surface Thus relieved of pressure, a large quantity of water flashes into steam and ejects the whole column violently into the air If the circulation of the waters be impeded by throwing stones into the geyser tube, the eruption can often be hastened Geysers in many cases were originally hot springs, from which they have gradually developed by building and extending their tubes Hot alkaline springs carry silica in solution, which is readily precipitated along the path of the flowing water, as the tube becomes longer, the difference in temperature between the upper and lower portions increases, until sufficient to cause an eruption In course of time geysers must lose their activity and again become hot springs, or the flow of water may be entirely checked by structural changes in the tubes Consult *United States Geological Survey of the Territories*, 5th and 6th Annual Reports (Washington, 1872–73), Bunsen, *On the Intimate Connection Existing Between the Pseudo-Volcanic Phenomena of Iceland* (London, 1848), Malfroy, *On Geyser Action at Rotorua*, (1891), Hague, *The Geology of the Yellowstone National Park* (Washington, 1904) See GEOLOGY

GEYSERITE, gī'zēr-īt A name given to a variety of opal that occurs in concretionary deposits around the geysers of Iceland, New Zealand, and in the Yellowstone Park It frequently occurs in white or grayish porous stalactitic or filamentous forms that are sometimes of great beauty Varieties that are compact-massive or scaly-massive in appearance are sometimes found The mineral consists essentially of silica, with from 9 to 13 per cent of water

GEYTER, gī'tēr, JAN (JULIUS) DE (1830–1905) A Flemish poet, born at Lede His works are distinguished by a largeness of vision and vigorous, expressive language They include *Drie menschen van de weg tot in het graf*. *Een epos uit onzen tijd* (1861) (incomplete), *Geuzenlied* (1872), *Reinaart de vos*, a charming version of the old poem (1874), *Vlaanderens kunstroem* (1877), *De Wereldin Schoolcantate* (1878), *De Rijn* (1882), and the epic *Keizer Karel en het rijk der Nederlanden* (1888), his masterpiece

GE'ZER. An ancient Canaanitish city According to Josh x 33, King Horam of Gezer fought against the invading Hebrews and maintained its independence (ib, xvi 10) Gezer (Gaz-ri) is mentioned frequently in the Tell el-Amarna letters, King Yapahi complains to the King of Egypt of the dangerous advance of the Hebrews (Habiri) In the time of Solomon (c 993–953) the city was recaptured by the King of Egypt and given to the King of Israel as his daughter's dowry (1 Kings ix 16) It became an important fortress in the days of the Maccabees (1 Macc iv 15, ix 52, xiii 43 et seq, xiv 7, 34, xv 28, 35, xvi 1, 19, 21) Simon built a palace at Gezer (Gazera), and John Hyrcanus lived there It became an episcopal city of Palæstina I (Gadara), and the Crusaders under Baldwin IV here (Mont Gisart) defeated Saladin in 1177 The excavations carried on by the Palestine Exploration Fund, under the leadership of Macalister, at Tell Jezer, near Abu Shusheh, not far from Ramleh, the modern site of the city, have revealed five main epochs in its history Two of them are earlier than the Israelitish occupation The lowest stratum contains cave dwellings, with flint implements, the Canaanitish stratum above this is rich in Egyptian seals, rings, and other ornaments The High Place, with its sacred stones, or mazzeboth, and its clay vessels containing the bodies of children, is of great interest A stone with the inscription "boundary of Gezer" makes the identification certain Consult. Mac-



GEYSERS

CASTLE GEYSER AND CRYSTAL SPRING (UPPER)

NORRIS GEYSER BASIN (LOWER)

alister, *Bible Side-Lights from the Mound of Gezer* (London, 1906), id, *The Excavations at Gezer* (ib, 1912), id, *A History of Civilization in Palestine* (Cambridge, 1912), Vincent, *Canaan d'après l'exploration recente* (Paris, 1907)

GFRORER, g'-fiē-rēr, AUGUST FRIEDRICH (1803–61) A German historian He was born at Calw, Wurttemberg, and much against his own inclination was put to studying theology at the University of Tubingen and kept at it till the age of 22 After traveling in Switzerland and Italy, he became tutor in theology at Tubingen in 1828 and in 1830 secured a position in the National Library at Stuttgart His ability was very great and his energy inexhaustible, and the works he now put forth received and deserved great attention His whole life manifested a steady evolution from liberal Protestantism to Ultramontane Catholicism During the writing of his *Philo und die judisch-alexandrinische Theosophie* (1831) and the *Geschichte des Urchristentums* (1838) his views on Christianity underwent a radical transformation During the publication of *Gustav Adolf und seine Zeit* (1835–37) he changed his point of view, and while at work on his *Allgemeine Kirchengeschichte* (1841–46), embracing the history of the Christian Church to 1305, he became convinced of the wrongfulness of the Reformation and the truth of the Catholic position He was called to the chair of history in the Catholic University at Freiburg in 1846, showed himself an enemy of Prussia at the Frankfort Parliament (1848–49), and became a vigorous champion of the Catholic faith, which he embraced in 1853 He died July 6, 1861 Besides the works already mentioned, he wrote *Urgeschichte des menschlichen Geschlechts* (1855), *Papst Gregor VII und sein Zeitalter* (1859–61), *Geschichte des 18 Jahrhunderts* (1862–74), *Zur Geschichte deutscher Volksrechte* (1866), *Byzantinische Geschichten* (1872–74) The last three works were published by Weiss after the death of the author

GHADAMES See GADAMES

GHARA, gūr'ā. The name of the Sutlej, the easternmost of the five rivers of the Punjab, below its confluence with the Beas The Ghara unites with the Chenab, which has collected the waters of the Jhelum and the Ravi, to form the Panjnad, which carries the drainage of the Punjab into the Indus See SUTLEJ

GHARDAYA, gar-dī'a See GARDAIA

GHA'RIAL, or **GHARIYAL** See GAVIAL.

GHATS, gats The name (see GHATS below) applied to two converging ranges of mountains, or scarpments, which run parallel with the east and west coasts of the peninsula of India, hence known as the *Eastern* and *Western* Ghats

The Western Ghats stretch from the south side of the Tapti to Cape Comorin (Map India, B 5) Though they are generally far more continuous and distinct than the Eastern Ghats, yet they are sharply divided by the gap of Palghatcheri, 16 miles wide, the northern section measuring 800 miles in length and the southern 200 Their general elevation appears to vary from about 3000 feet to fully 7000 feet The peak of Dodabetta, in that portion of the Western Ghats known as the Nilgiris, is 8760 feet above sea level The opposite faces of these mountains differ remarkably from each other Seaward, almost perpendicular precipices, to speak generally, sink at once nearly to the level of the sea, at a distance ranging from 40 to 70 miles, but at one place approaching within 6 miles. This maritime strip, more particularly towards the south, especially under the influence of the southwest monsoon, presents that singular feature of stagnant shallow lakes known as the "Backwaters" (See COCHIN) Landward, there is a gradual slope to the Eastern Ghats, which appear as hills near the eastern escarpment of the Deccan, a distance of from 50 to 150 miles from the Bay of Bengal (Map India, C 6) The main part of the eastern range extends, with an average height of 1500 feet, from near Orissa to Coimbatore At Coimbatore a spur ridge connects them with the Western Ghats just north of the gap of Palghatcheri

GHATS (Hind *ghāt*, step, Skt *ghatta*, quay, from *ghatt*, to touch, connected with *gharsh*, to rub), or, as usually written, GHAUTS Structures along the banks of rivers, erected to afford easy access to bathers They are peculiar to northern Hindustan and line the river banks in most of the great cities, more especially those situated on the Ganges A ghat consists, in general, of a broad quay, forming the essential part of the structure, with one or more broad flights of steps leading to a long, high building, fronting the river and serving for the protection of loungers from the sun's rays The uniformity of the long lines of steps is broken by small projections, often crowned by kiosks, which relieve the eye Though the Ganges, being the sacred river, is par excellence the river of ghats, one of the most beautiful in Hindustan is that at Maheswar, on the Nerbudda, and though Benares prides itself upon possessing the greatest number of ghats, it is almost rivaled by Ujjain and other cities Consult Fergusson, *History of Indian and Eastern Architecture* (rev ed, London, 1910), and Havel, *Indian Architecture* (ib, 1913)

GHAVERS See GHEBERS

GHAZAL', or **GHAZEL'** (Ar, love poem, from *ghazila*, to be affectionate) An Oriental ode It was a favorite form of lyrical composition among the Persians and corresponds in some respects to our idea of the sonnet The ghazal consists of from 5 to 16 or 17 couplets, written in the same metre and according to fixed rules of rhyme The opening couplet has its two lines rhyming with each other, and this rhyme is repeated in the second line of each succeeding couplet, which gives to the ghazal a uniformity that approaches monotony according to Western, but not Eastern, standards of taste In the last two lines or couplet royal, called *makta* or *khātimah* (close), the poet introduces his own name as a signature or envoy Certain departures from these formal rules are found As to subject, the burden of the ghazal is generally the praise of the poet's sweetheart, or his despair at her indifference, the beauty of the spring, the blush of the rose, the song of the nightingale, or the joys of wine and conviviality. Among the Persian poets, Hafiz (q.v) is the most famous writer of ghazals, and a number of these have, so far as the form is concerned, been successfully rendered into English. Mention, e g, may be made of Leaf's *Versions of Hafiz* (London, 1898), Payne's translation into English verse (ib, 1901), and Le Gallienne's *Odes from the Diwan* (ib, 1905) The German poets Platen, Ruckert, and Bodenstedt have very skillfully adapted this form of composition in their "Ghaselen." On the latter, consult Remy, *Influence of India and Persia on German Poetry*

(New York, 1901) For other poets who wrote in this form of verse, consult Browne, *Literary History of Persia* (ib, 1906)

GHAZALI, ga-za'lē, ABU HAMID MOHAMMED IBN MOHAMMED AL TUSI AL SHAFI'I AL (1059–1111 AD). One of the most original thinkers and possibly the greatest theologian in the Moslem world He was born at Tus in Khorassan and belonged to the family of Ghazala He studied theology with the Imam al Haramain in Nishapur until 1085, when he went to Bagdad. He received an appointment as professor at the Nizamiya in 1091, but in 1095 he resigned his position in order to travel He lived in Damascus and Jerusalem, where he visited the church of the Holy Sepulchre, and made his pilgrimage to Mecca in 1097 After several years of scholarly retirement he was appointed to a chair at Nishapur in 1105, but after some time returned to Tus and entered a Sufi convent, where he died in 1111. Ghazali submitted the philosophical views and to some extent the religious doctrines held among Moslems at his time to a searching criticism This criticism, however, was not wholly negative, he never abandoned certain fundamental positions of Moslem dogma and of the scholasticism which he attacked He was not a skeptic, nor a radical like Abu'l Ala al Ma'arri (q v) It was his desire to revive the religious life in Islam by bringing it back from scholastic speculation, and the intolerance and strife of rival sects, to a simple interpretation of the Koran, a wholesome fear of coming judgment, love of Allah, and fellowship with all believers The practical tendency of his preaching, his great eloquence, the subtlety of his thought, the warmth of his religious feeling, and the mysticism so manifestly giving him spiritual satisfaction, made his influence deeply felt He was called "the restorer of the faith," and al Suyuti said of him, "If there could be another prophet after Mohammed, it would surely be al Ghazali" There are about 70 works of Ghazali known to be preserved in manuscript form in various libraries, but few have been critically edited, printed, or translated One of his most important books *Ihya 'ulum al din* (Revival of the Religious Sciences) has been printed at Bulak and Cairo, but only parts have been translated by McDonald in *Journal of the Royal Asiatic Society* (London, 1901–02), his *Religious Attitude and Life in Islam* (Chicago, 1909), and in Hastings, *Dictionary of Religion and Ethics*, ii, 677 et seq. (New York, 1910), and a summary given by Asin His *Makasid al falasifa* (Tendencies of the Philosophies) has been published in part by Beer, and there is a Latin translation made by Gundisalvi (Venice, 1506). The continuation of this work, the famous *Tahafut al falasifa* (Destruction of the Philosophies), which called forth so spirited an answer from Averroes (q v) and had so great an influence on Jewish and Christian thought, has been printed in Cairo and Bombay, but only parts have yet been translated by De Boer, Carra de Vaux (*Muséon*, vol xviii), and Asin The *Risala al kudsiya* has been translated by Bauer under the title *Die Dogmatik al-Ghazali's* (Halle, 1912) An eschatological study, *al Durra al fakhira*, has been published and translated by Gautier under the title *La perle précieuse de Ghazali* (Geneva, 1878). Ghazali's important spiritual autobiography *Munkidh min al dalal* (Deliverance from Error) was printed at Constantinople, 1876, and translated by Barbier de Meynard Consult McDonald, "Life of al Ghazali," in *Journal of American Oriental Society* (Boston, 1899), id, *Development of Muslim Theology* (New York, 1903), id, *Aspects of Islam* (ib, 1911), id, in *Enzyklopædie des Islam* (Leyden, 1914), Miguel Asin Palacios, *Algazel, dogmatica, moral, ascetica* (Saragossa, 1901), Carra de Vaux, *Gazali* (Paris, 1902), Schmolders, *Essai sur les écoles philosophiques chez les Arabes* (ib, 1842), De Boer, *Die Widersprüche der Philosophie Nach al Ghazzali und ihr Ausgleich durch Ibn Rosnd* (Strassburg, 1894), Brockelmann, *Geschichte der arabischen Literatur*, i (Weimar, 1898), Broyde, in *The Jewish Encyclopædia* (New York, 1903), Nicholson, *A Literary History of the Arabs* (London, 1907), Strecken and Horten, in *Die Religion in Geschichte und Gegenwart* (Tubingen, 1910)

GHAZAN KHAN, ga-zan' kan See MONGOL DYNASTIES

GHAZI (ga'zē) **MOHAM'MED** See SHAMYL

GHAZIPUR, ga'zē-pōōr' The capital of a district of the same name in the United Provinces, British India It extends for 2 miles along the left bank of the Ganges and is 44 miles northeast of Benares (Map India, E 4) The climate is hot and humid Large quantities of roses are grown in the vicinity for the manufacture of rose water and attar of roses Ghazipur is the opium depot for the United Provinces, and the large government factory occupies more than 45 acres, employing 3500 hands during the busy season Its chief objects of interest are the remains of Chahal Situn, or Palace of Forty Pillars, mounds of masonry, a mud fort along the river front used as the customhouse, and a fine marble statue of Lord Cornwallis, who died here in 1805 Pop, 1901, 39,429, 1911, 22,165

GHAZNI, găz'nē, or **GHIZNI,** gĭz'nē A city in the southeastern part of Afghanistan, over 92 miles southwest of Kabul, situated on the river Ghazni at an altitude of 7280 feet (Map Afghanistan, N 6) It is surrounded by a mud wall and derives considerable commercial importance from its position on the route between Persia and India, which latter is entered by the Gomal Pass It has a caravan trade in fruit, wool, and skins Pop, once 10,000, now probably not more than 4000 It is of great strategic importance, is walled, and has an old castle in the highest part of the town A short distance from Ghazni are the ruins of Old Ghazni, once one of the finest cities of Asia, and capital of the Ghaznivides (q v). Ghazni was taken by the English under Lord Keane in 1839 and under General Nott in 1842

GHAZNIVIDES, găz'nĭ-vīdz A celebrated Mohammedan dynasty of 21 rulers, named from their seat in Ghazni (q v) In the height of its power it possessed an empire extending from the Tigris to the Ganges and from the Sihun, or Syr-Darya, to the Indian Ocean The founder of the line was ALP-TIGIN, a freedman of Nasr I of the Samani dynasty, who ruled over Ferghana, Kashgar, and Turkestan Alp-Tigin, born in 880, was appointed Governor of Khorassan In 962 he took possession of the fortress of Ghazni and for 15 years successfully withstood the Samani (q v). On his death, in 976, his slave SABUK-TIGIN, who had become his son-in-law, was unanimously chosen as his successor He was distinguished for prudence and valor as well as for humanity and justice. By him the king-

dom was extended from the Indus to Khorassan and from the Gulf of Oman to the Syr-Darya, or Sihun His invasion of India from the north-west was the first attempted by a Moslem and is important in that it pointed the way into Hindustan Sabuk-Tigin died in 997 and was succeeded by his younger son ISMAIL The elder son, MAHMUD YAMIN UD-DAULAH, the most famous of the dynasty, who had been appointed Governor of Nishapur in 994, hearing of his father's death, hastened to Ghazni He deposed Ismail and assumed the reins of government in 999, with the title of Sultan He was a devout Moslem and vowed that every year should see him wage a holy war against the nonbelievers In the year following he took complete possession of Khorassan and in 1001 commenced a series of at least 16 destructive inroads into Hindustan On the 8th of Muharram (27th of November) he defeated Jaipal, King of Kabul and Lahore, near Peshawar, with immense slaughter In 1006, while on his second expedition to India, he was recalled by the news that Ilak Khan of Kashghar, who in 999 had conquered the Samani, was ravaging Transoxania In 1007 and 1009 Mahmud made his third and fourth expeditions into Hindustan and each time carried off an immense booty in money, jewels, and slaves. Returning to Ghazni, he made a liberal distribution from his treasures among the poor and the ministers of religion Within the next few years he reduced Ghur, Jurjistan, and Khwarezm In the winter of 1025–26 he was engaged in his last expedition against the Hindus, the famous expedition to Somnath in southern Gujarat, where he obtained an enormous booty In 1029 he conquered Irak, but on April 30 of the following year he died at Ghazni, aged 63 years At this time the Empire of Ghazni was at the summit of its glory Mahmud of Ghazni was a great conqueror and a patron of learning, but his fanaticism and greed are dark blots on the short-lived empire which he founded as the first foreign dominion over India Lacking in constructive statesmanship, he only attempted to attain outward order and security, so that his poorly united kingdoms began to fall asunder soon after his death He was succeeded by a younger son, MOHAMMED, who in October of the same year was compelled to resign the sovereignty to his younger brother, MASUD I This prince was in 1040 signally defeated by the Seljuks (q v), who had taken possession of Khorassan Though an able and warlike prince, misfortunes crowded thickly around his declining years He was deposed in 1040 and murdered after a few months of imprisonment During his reign the Seljuks took possession of Balkh, Khorassan, Khwarezm, Herat, and Irak The sovereigns who in succession reigned in Ghazni were MAUDUD (1040–48), MASUD II (1048), BAHAUD-DIN ALI (1048), ABD UR-RASHID (1049–52), TUGHRIL, the usurper (1052), and FARRUKH-ZAD (1052–59) In their reigns there is little besides internecine quarrels of Ghazni, and the encroachments of the Seljuks on the west and north The reign of Farrukh-zad, however, shed a bright lustre over the expiring glory of Ghazni, for the Seljuk prince, Daud, who thought to take advantage of the dissensions at Ghazni and marched against it, was signally defeated by Nush-Tigin, the general of Farrukh-zad Encouraged by this victory, the Ghaznivide forces marched into Khorassan and regained that province. On news of this second defeat, Alp-Arslan (q v) was sent by his uncle Tughril Beg (Togrul Bey) to stop the progress of the Ghaznivides In the battle which ensued, fortune changed sides, and Nush-Tigin was totally defeated. A treaty of peace was then concluded Farrukh-zad was succeeded by IBRAHIM (1059–99), in whose reign there was to a certain extent a revival of the glory of the Ghaznivides, MASUD III (1099–1114), SHIRZAD (1114–15), ARSLAN (1115–18), and BAHRAM (1118–52) During the reign of this last prince the Ghuri, a tribe inhabiting the mountainous country of Ghur in Afghanistan between Ghazni and Herat, began to make inroads upon the territory of Ghazni and, growing bolder by success, attacked and took the capital itself, driving Bahram across the Indus But on the retreat of part of the Ghuri to their own country, Bahram retook his capital and put to death the Ghuri prince, Saif ud-Din Suri Learning this, the brother of the prince, Ala ud-Din Husain, hastened from Ghur and, having defeated Bahram, gave up Ghazni to be pillaged by his followers Bahram was thus driven a second time across the Indus in 1149 and died in the following year His son KHUSRU SHAH (1152–60) succeeded him and took up his residence in Lahore The many attempts which he made to repossess himself of Ghazni and the surrounding territory were unsuccessful KHUSRU MALIK (1160–86), the twenty-first and last monarch of the dynasty, occupied himself in the first part of his reign (1160–66) in extending and consolidating his Indian possessions, but subsequently his whole energies were required to repel the attacks of Shihab ud-Din Mohammed, Prince of Ghur, who, having conquered all the territory west of the Indus, now sought to drive the race of Sabuk-Tigin from their last possession In 1184 Lahore was all that remained to Khusru Malik, and the taking of that city by the Ghur prince in 1186 put an end to the power of the Ghaznivides Consult Lane-Poole, *Mediæval India under Mohammedan Rule* (London, 1903)

GHAZZALI See GHAZALI

GHEBERS, gē′bērz *or* gā′bērz, **GABERS, GUEBERS, GHAVERS** (Turk *Ghiaur*, or *Ghaur*) The adherents in Persia of the ancient religion founded or reformed by Zoroaster As worshipers of Ormazd in Iran, they correspond to the Parsis or Zoroastrian exiles in India This small band, 8000 or 10,000 in number, stands with the Parsis to-day as the sole representatives of the faith of the Prophet of ancient Iran

The name Gäber, Gĕber, Ghĕber, or Gueber, as infidel, is familiarly applied to the fire worshipers in Persia, e g, in Moore's *Lalla Rookh* and in Byron's "Giaour" The origin of the name is open to discussion It is commonly explained as a derivative from the Arabic *Kāfir*, which is applied as unbeliever to all non-Mohammedans, and is supposed to have been given first to the Persian Zoroastrians by their Arab conquerors in the seventh century A D This explanation is doubtful on phonetic grounds A second suggestion seeks to trace in *gaber* a tribal name or designation as implied in the name *Khabār* of the Talmud (Yebam 63 b, Gitt 17 a, etc), and in Origen, *Contra Celsum*, 6291, who mentions Kabirs or Persians and declares that Christianity has borrowed nothing from them If a guess might be hazarded, one might be tempted to connect the word with the Pahlavi or Middle

Persian *gabrā*, found also in Aramaic, in the sense of 'man,' which is applied to the Zoroastrians in the form *Mōg-gabrā*, or 'Magian man', and then assume a generalization in the sense of 'people, gentiles,' with the derogatory significance of unbeliever, infidel, pagan, heathen, as in the Gentiles of the Bible Another name applied by the Mohammedans to this sect is *Ataš-parast*, or 'fire-worshipers', or again *Majūs*, 'from the Magi,' their ancient priesthood; or also *Fārsī*, i e, Parsi, from *Fārs* or *Pārs*, the name of the Province of Persia They designate themselves, however, as *Beh-Dīnān* (those of the Good Faith)

The vicissitudes and misfortunes of these followers of the ancient Persian creed through history have been many and varied Passing over the earlier history, to be dealt with in other articles, the battle of Nehavend (c 641 A D), and the final conquest of Iran by Islam, wrought a complete change in the religious tenets of Persia The creed of Ormazd and of Zoroaster sank before the rising crescent of Allah and his Prophet, the Avesta gave place to the Koran, and the teachings of Mohammed were adopted by the Persians generally Only a few sought freedom to worship Ormazd through flight and exile in India; these formed the later sect of the Parsis (q v) The small remnant that chose both to abide by their ancestral faith and to remain in their old home met with persecution and oppression So great, in fact, have been the trials of these devoted Zoroastrians for their faith that within the last 200 years they have dwindled down from 100,000 to a mere handful of representatives that still preserve the early creed Through hardships they have been reduced largely to poverty and ignorance, but, thanks to the efforts of their well-to-do brethren, the Parsis of Bombay, and the more liberal government of modern Persia, their condition has been greatly ameliorated within the last generation. Most of them that exist to-day are to be found in Yezd and Kirmān, a few also in Teheran, Ispahan, Shiraz, Urumiah, or about the eternal fire of the naphtha wells of Baku But, scattered as they are, they have still kept alive in Iran the spark of their fading worship there, and they still maintain a high reputation for honor, uprightness, morality, and obedience to law that characterizes their more fortunate Parsi brethren in India, and they may rightly claim their title to being men of the "Good Faith." Consult Browne, *A Year amongst the Persians* (London, 1893), Sykes, *Ten Thousand Miles in Iran* (ib, 1902), Jackson, "Die iranische Religion," in vol ii of the *Grundriss der iranischen Philologie* (Strassburg, 1904). See AVESTA, PARSIS, PERSIA, ZOROASTER

GHEE, gē (Hind *ghī*, from Skt *ghrta*, clarified butter, p p of *ghar*, to drip) A kind of clarified butter used in many parts of India and the East, prepared from the milk of buffaloes or cows The fresh milk is boiled for an hour or more, it is then allowed to cool, a little curdled milk added, and the curdled mass churned. When the butter begins to become rancid, which is usually the case after a few days, it is boiled till all the water and curd have separated The fat is then removed, salted, often a little sour milk and some aromatic herbs added, and put into closed pots to be kept for use It is said to keep for years when carefully prepared The natives of many parts of India use it extensively, not only as a food, but in medicine and in religious rites Its strong odor and disagreeable flavor are not attractive to Europeans

GHEEL, gāl A well-known Belgian colony for the insane, 26 miles east-southeast of Antwerp (Map Belgium, C 3) It is a fertile spot, inhabited and cultivated by 10,000 or 11,000 peasants, in the midst of an extensive sandy waste, called the Campine

Historically Gheel is noted as having been the spot where a woman of rank, said to have been of British origin, was murdered by her father in consequence of her resistance to his incestuous passion Pilgrims, the sick, the sorrowful, and the insane, visited the tomb of the Christian virgin, the last were restored to sanity and serenity Dymphna became the tutelar saint of those stricken in spirit, a shrine rose in her honor, which now for 10 centuries has been consecrated to the relief of mental disease and has collected around it hundreds of lunatics, chiefly of the poorer classes Formerly the afflicted underwent a sort of novitiate in a building adjoining the church, where they were chained to the wall, and subsequently passed under the mausoleum of their patron, but now there do not appear to be any other than the ordinary ministrations of the church to which the patients belong resorted to as treatment

About 1300 insane persons are lodged with the citizens of this community, or with 1000 heads of families, and are controlled and employed by them Until recently this colony was merely a psychological curiosity, but the absurdity of treating all cases alike, and independently of medical aid, led to the institution of a medical staff, the erection of a hospital, and the introduction of many salutary alterations in the relations between the insane and their custodians, in classification and supervision Consult Duval, *Gheel* (Paris, 1867), Brandes, *Die Irrencolonien* (Hanover, 1865), Ruedy, *Gheel* (Bern, 1874); Pilgrim, "A Visit to Gheel," in *American Journal of Insanity* (Utica, N Y, 1886), Jeliffe, "A Visit to Gheel," in *Medical News* (Philadelphia, 1904).

GHEGA, gā'ga, KARL VON (1800–60). An Austrian civil engineer, born in Venice. After being engaged in hydraulic engineering and in the construction of mountain roads in northern Italy and the Tirol, he spent several years in investigating railroads in the United States and upon his return was intrusted with several important projects, such as the celebrated Semmeringbahn He originated a number of improvements in railroad construction and wrote many important works on that subject, among which may be mentioned *Uebersicht uber die Hauptfortschritte des Eisenbahnwesens 1840–50* (3d ed, 1853) and *Ueber nordamerikanischen Bruckenbau und Berechnung des Tragungsvermogens der Howeschen Brucken* (1845)

GHENT, gēnt (Fr *Gand*, from OFlem *Gend*) The capital of the Province of East Flanders, Belgium, and one of the most important cities of the country, situated at the confluence of the Lys with the Scheldt, 31 miles northwest of Brussels (Map· Belgium, B 3) It is intersected by a number of streams and canals spanned by more than 200 bridges The older portion with its narrow streets and gabled buildings bears a decidedly Flemish aspect and possesses numerous buildings of great historical interest, the

newer part of the city is well laid out and modern in its architecture Ghent is about 8 miles in circumference and contains extensive gardens and promenades The chief ecclesiastical building is the cathedral of St Bavon, with its unpretentious Gothic exterior and splendid interior The crypt dates from 941, the last part of the building was completed only in 1554 Besides the architectural beauty of its interior and its age, the cathedral is famous for its art treasures, among which are included the famous "Adoration of the Lamb" by the brothers Van Eyck, and one painting by Rubens Near the cathedral stands the belfry, a square tower 375 feet high surmounted by a gilded dragon and containing a chime of 44 bells It was begun in 1183 The church of St Nicholas, the oldest in Ghent, was begun in the tenth century, but the larger part was constructed at the beginning of the thirteenth. It is built in the early Gothic style and has an unfinished tower with 10 turrets The church of St Michael, dating from the fifteenth century, is built in Gothic style and contains a number of fine pictures, including the "Crucifixion" by Van Dyck.

The secular buildings of Ghent are also of great architectural beauty and historic interest The town hall, of which the northern façade was constructed in 1518–33 and the eastern façade in 1595–1622, is regarded as one of the finest specimens of Gothic architecture in Belgium The Palais de Justice, completed in 1846, is also an imposing building with a Corinthian portico, and a bronze statue of Metdepenningen in front The Institut des Sciences, completed in 1890, is one of the largest public buildings of Ghent and contains the lecture rooms and laboratories of the university (see GHENT, UNIVERSITY OF) Ghent has a number of old guild houses and about 20 monasteries Among the squares of the town the most noteworthy is the Marché du Vendredi, which has been the scene of the most important events in the history of the city It has a bronze statue of Jacob van Artevelde in the centre and a huge cannon, known as the Dulle Griete, in the northwest corner In the northeastern part of the city is situated the nunnery of Grand Béguinage, founded in the thirteenth century It is surrounded by walls and moats, and with squares, church, and small houses, presents the appearance of a town in miniature The old castle, or Oudeburg, constructed in the tenth century, was once the residence of the counts of Flanders and after a century of service as a factory has come into the possession of the city, which has restored it to its former appearance

At the head of the educational institutions of Ghent is the university, with its four faculties of philosophy, law, natural sciences, and medicine It has an attendance of about 500 students in these four departments, its library contains about 300,000 volumes, and there are collections of coins and copper engravings The laboratories of the university and the faculty of natural sciences have been transferred to the Institut des Sciences, opened in 1890 Besides the university, Ghent has a Gymnasium conducted by the Jesuits, a seminary, an academy of painting, a conservatory of music, and several schools for manual training There are also two theatres, an art museum, botanical and zoölogical gardens Ghent has decreased somewhat in industrial importance since the fifteenth century, when it was one of the chief centres of the textile industries of Europe It has still a considerable number of linen, woolen, and cotton mills, cotton-printing works, lace factories, tanneries, sugar refineries, cement works, breweries, etc Among the chief products of Ghent are flowers, which are exported all over Europe Communication facilities are excellent and commerce is still of considerable magnitude, the exports consisting chiefly of manufactured goods and agricultural products The tonnage of vessels entering the port was, in 1893, 478,233, in 1903, 772,631, in 1911, 1,022,309 Ghent is the seat of a court of appeal, a commercial court, and a number of consular representatives Pop, 1880, 131,431, 1900, 160,949, 1910, 164,650, 1912, 167,177

Ghent is mentioned in history as early as the seventh century About the year 868 Baldwin Bras-de-fer, the first Count of Flanders, built a fortress here as a defense against the Northmen Under the counts of Flanders, Ghent continued to prosper and grow until in the fourteenth century it was able to send 20,000 men into the field The wealth of the citizens of Ghent, and the unusual measure of liberty which they enjoyed, encouraged them to resist with arms any attempt to infringe upon their peculiar rights and privileges This readiness to arm in their own defense is exemplified in the struggles in which Jacob and Philip van Artevelde (qq v) played a memorable part For many years Ghent maintained a vigorous but unavailing resistance against the dukes of Burgundy, who sought to be recognized as counts of Flanders In 1540 the city, having ventured to defy the Emperor Charles V (a native of the place), was terribly chastised In the various wars in the Netherlands, Ghent suffered severely For 20 years, from 1794, Ghent belonged to France and was the capital of the Department of the Scheldt The town was occupied by the Germans after the fall of Antwerp in 1914 (see WAR IN EUROPE) Consult Gheldorf, *Histoire de la ville de Gand* (Brussels, 1846), Pirenne, *Bibliographie de l'histoire de Belgique* (Brussels, 1902), for works on separate periods and events, Fris, *Bibliographie de l'histoire de Gand jusqu'à a fin du quinzième siècle* (Ghent, 1907)

GHENT, TREATY OF A treaty between the United States and Great Britain, which ended the war between the two countries known as the "War of 1812" The American negotiators were John Quincy Adams, James A Bayard, Henry Clay, Jonathan Russell, and Albert Gallatin Of these Bayard and Gallatin had been sent to St Petersburg in 1813, to join Adams in action upon Russia's offer of mediation, under express instructions to secure a stipulation against impressment Russia's good offices were declined by England, while the termination of the Napoleonic wars so altered conditions that the American commissioners were given less stringent instructions both as to impressment and as to the fisheries The British representatives were Lord Gambier, Henry Goulburn, and William Adams After prolonged negotiations the treaty was signed by the respective commissioners on Dec 24, 1814, was ratified by the United States Senate on Feb 17, 1815, and was formally proclaimed by President Madison on the following day Its main provisions were (1) restoration of all territory, places, and possessions taken by either party from the

other during the war, except certain islands, (2) Art. IV provided for the appointment of a commission to decide to which of the two powers, according to the boundary stated in the Treaty of 1783, certain islands in and near Passamaquoddy Bay belonged, and the commission failing to come to a decision, the subject was to be referred to some friendly sovereign or state, (3) Art V–VIII provided for commissions to settle the line of boundary as described in the Treaty of 1783—the commission to settle the line from the river St Croix to where the forty-fifth parallel cuts the river St Lawrence (called the Iroquois, or Cataraqua, in the treaty), another to determine the middle of the water communications from that point to Lake Superior, and a third to adjust the limits from the water communications between Lakes Huron and Superior to the most northwestern point of the Lake of the Woods, and (4) Art IX bound both parties to use their best endeavors to abolish the slave trade, as being "irreconcilable with the principles of humanity and justice" The treaty failed, however, to speak of the impressment of American seamen, the chief cause of the war, or of the claims of the United States to participate in the Newfoundland fisheries, recognized in the Treaty of 1783, or of the question as to British and American naval forces on the northern lakes, or the rights of neutrals All these questions, especially that as to the fisheries, became the subjects of much subsequent negotiation "Perhaps at the moment the Americans were the chief losers, but they gained their greatest triumph in referring all their disputes to be settled by time, the final negotiator, whose decision they could safely trust" In 1910 the "American Committee for the Celebration of the One Hundredth Anniversary of Peace Among English-Speaking Peoples" was formed Theodore Roosevelt was appointed honorary chairman Similar committees were appointed in England, Canada, Australia, and the city of Ghent. Delegates from all these committees met in New York, May 5–9, 1913, and decided to commemorate the century of peace by erecting monuments and memorials, by establishing exchange professorships in British-American history, and by rewriting the history of the period impartially For a brief account of the negotiations at Ghent, consult Henry Adams, *History of the United States*, vol ix (New York, 1891) For a bibliography of the subject, consult Babcock, *The Rise of American Nationality* (ib, 1906)

GHENT, UNIVERSITY OF A Flemish university, founded by King William I of Holland in 1816 It was housed in the town hall until 1820, when the old Jesuit college was remodeled for its use At the time of the revolution of 1830 the university was seriously crippled by the suppression of two of its four faculties, in 1835, however, these were restored Various special schools have been, from time to time, merged in the university, which now has faculties of philosophy, science, law, and medicine. In 1913 the students numbered 1253, including 272 foreigners As in Liége, the institution is maintained by the state The libraries of the city and university are combined in one collection, containing over 350,000 volumes, especially rich in the history and literature of the Netherlands; there are also many valuable manuscripts

GHENT, WILLIAM JAMES (1866–). An American writer on social topics, born at Frankfort, Ind He was for a time connected with several trade papers in New York and was thereafter a contributor to the *Independent* and other periodicals In 1899 he was literary campaign manager for Samuel M ("Golden Rule") Jones, of Toledo, and in 1911 he became secretary to Victor L Berger (q v) His publications include *Our Benevolent Feudalism* (1902), *Mass and Class* (1904), *Socialism and Success* (1910)

GHERARDESCA, gā'rar-dĕs'ka. An Italian family of Tuscan origin, prominent in the thirteenth and fourteenth centuries Their large territorial possessions lay between Pisa and Piombino In the thirteenth century the counts of Gherardesca exercised a preponderating authority in the Republic of Pisa and were at first prominent Ghibellines, and enemies of the Visconti of Milan, who headed the Guelphs The most celebrated of this family is Count Ugolino della Gherardesca, whose name and fate have been invested with undying interest by Dante in the *Inferno* (Canto 32) Count Ugolino, according to Ghibelline accounts, was possessed of a lawless ambition and a subtle unscrupulous spirit Allying himself with the Guelph forces of Florence and Lucca, he compelled the Pisans in 1276 to restore him his territories, of which he had been deprived in 1274 No sooner was he reinstated in his possessions than he began to devise anew ambitious schemes The war of the Pisans with the Genoese afforded him the opportunity he desired In the battle of Meloria (1284) Ugolino is said to have contrived the defeat of the Pisans He was, however, named captain general for 10 years On account of his cruelty and vindictiveness a conspiracy was formed against him, headed by his former supporter, Ruggieri, the Archbishop of Pisa In July, 1288, with two sons and two grandsons, he was thrown into the tower of Gualandi (the Tower of the Seven Streets), where they all perished by starvation, their dungeon has since borne the name of the Tower of Hunger Consult Sismondi, *History of the Italian Republics* (New York, 1870), and G del Noce, *Ugolino della Gherardesca* (Rome, 1894)

GHERARDI, gā-rar'dē, BANCROFT (1832–1903) An American naval officer He was born in Jackson, La, served as midshipman in the navy from 1846 to 1850, and entered the Naval Academy in 1852 During the Civil War he commanded successively the *Chocorua* and the *Port Royal* of the West Gulf Blockading squadron and with the latter vessel pursued the Confederate gunboats *Morgan*, *Gaines*, and *Selma*, during the battle of Mobile Bay (Aug 5, 1864) After the war he attained the rank of rear admiral in 1887, commanded the Brooklyn Navy Yard (1887–89, 1893–94), and in 1893–94 was commander in chief of the North Atlantic squadron He was in charge of the Columbian international naval parade and review in New York harbor in 1893 and was vice commander of the New York Military Order of Foreign Wars He was retired from active service in 1894

GHERARDI DELLA TESTA, gā-rar'dē dĕl'lā tĕs'ta, COUNT TOMMASO (1818–81). An Italian dramatic writer, born at Terricciola (Province of Pisa) He studied at the University of Pisa and fought against Austria in 1848 He wrote poems, works of prose, fiction, and more than 40 comedies, some of which are

political satires They were very successful, for the dialogue is witty and at the same time natural Among them are *Cogli uomini non si scherza, Il vero blasone, Il sistema di Giorgio,* and *Il padiglione delle mortelle* His writings were published as *Teatro Comico* (1856–66, complete ed, 1872–83) He also wrote political verse in Giusti's manner Consult *Rassegna Nazionale,* vol iii (Florence, 1882), and Martini in *Nuova Antologia,* vol lxvii (Rome, 1897)

GHERKIN See CUCUMBER

GHETTO, gĕt'tō (of doubtful etymology, possibly from It *borghetto,* little town, dim of *borgo,* town) A Jewry Originally the name "ghetto" was applied to the quarters set apart for Jews in several cities of Italy and Bohemia, but it is now popularly used of the part of any city where Jews are numerous Both the name and the thing originated in Rome, in the time of Pope Paul IV, who first compelled the Jews to dwell within an inclosure set apart for them on the left bank of the Tiber, between Ponte Sisto and Ponte San Bartolommeo, and forbade their appearance outside of that quarter unless the men wore a yellow hat and the women a veil of the same color, to distinguish them from Christians This ghetto was removed in 1885. Other celebrated ghettos of renaissance Italy, where Jews dwelt perforce, were those of Florence (dating from 1570) and of Padua (dating from 1603) Many of the great cities of Europe and America have each a ghetto, or perhaps more than one, where only Jews dwell, or where they predominate, though Jews now inhabit these ghettos from choice and not by compulsion The ghetto has come frequently into literature from Goethe's *Dichtung und Wahrheit* to Zangwill's tales of London's Jewry and the Jewish tales of a talented group of American story-writers who picture life and character in New York's ghetto Consult Philipson, *Old European Jewries* (Philadelphia, 1894), Asch, *Bilder aus dem Ghetto* (2d ed, Berlin, 1907), Hapgood, *Spirit of the Ghetto* (Philadelphia, 1909)

GHI See GHEE

GHIBELLINES, gĭb'ĕl-lĭnz *or* -lēnz. See GUELPHS AND GHIBELLINES

GHIBERTI, gē-bâr'tē, LORENZO (1378–1455) A Florentine goldsmith, and one of the chief sculptors of the early Renaissance He was the son of Cione di Ser Buonaccorso and Madonna Fiore, a lady of distinguished Florentine family His mother left his father soon after his birth, but Lorenzo found a foster father in the goldsmith Bartolo Ghiberti, with whom she lived, and who married her after her first husband's death He adopted the lad and taught him his art, but Lorenzo was more drawn to painting, which he studied, perhaps under Gherardo Starnini Fleeing from the pestilence in 1400, he went to Rimini, where he decorated a room of the palace of Carlo Malatesta He returned to Florence, notwithstanding the inducements offered by Malatesta, in response to a letter from his stepfather, in 1401 The Merchants' Guild had decided to adorn the baptistery with two new bronze doors, and the signory invited all the artists of Italy to compete. Among the competitors of Ghiberti were Brunelleschi, Jacopo della Quercia, and Niccolò d'Arrezzo The subject to be presented was a bas-relief of the "Sacrifice of Isaac"

Ghiberti was much aided by the counsel of his adopted father, who criticized his designs and submitted them to competent citizens and strangers before the final one was cast The judges were unable to decide betwen Ghiberti and Brunelleschi Both of the winning designs are preserved in the Museo Nazionale, Florence, and Ghiberti's certainly appears superior in both composition and line Recognizing this, Brunelleschi generously withdrew, and on Nov 14, 1403, the commission was awarded to his rival

The doors were not completed and set up until April 14, 1424 Ghiberti made use of a number of assistants, among whom we find Donatello and Michelozzo, and was much aided by his stepfather. Twenty of the panels represent scenes from the "Life of Christ," four are devoted to the "Fathers of the Church," and four to the "Evangelists" These representations fulfill the highest demands of relief and, considered as reliefs, stand higher than those of the more celebrated east portal Among the best of the panels are the "Annunciation," the "Raising of Lazarus," the "Kiss of Judas," the "Birth of Christ," the "Purification of the Temple," and the "Youthful Christ Teaching" The figures of the "Evangelists" and of the "Fathers of the Church" are dignified and admirably draped, especially St Matthew All of the reliefs show reminiscences of the Gothic, especially in the garments, but the ornamentation is antique The corners of the panels are decorated with heads of prophets and sibyls

The north portals gave such satisfaction that, on Jan 2, 1424, Ghiberti received an order for the east gate—the famous "Paradise Portals" The subjects for these were selected from the Old Testament by Leonardo Bruni, the Chancellor of the Republic, but the designs were by Ghiberti himself The technical skill displayed in handling relief is most remarkable, the composition is faultless, and sometimes four different subjects are handled in the same fashion and yet without conflict In some panels there are as many as 100 figures, with architectural and landscape backgrounds.

Among the finest reliefs are the first, representing in one panel the "Creation of Adam," the "Creation of Eve," the "Fall of Man," and the "Expulsion from Paradise" In these the groups of angels accompanying the Creator are especially beautiful Another fine panel is "Moses upon Sinai," in which we see the expectant, terrified throng of the Israelites below, among whom is the famous group of a "Mother and her Children" Equally beautiful are the 24 statuettes of prophets and other scriptural personages, by which the panels on each portal are surrounded There are also heads of prophets and sibyls at the angles of each relief, among which are two especially interesting ones, representing Ghiberti and his stepfather The door frame is carved with tasteful Renaissance ornamentation of foliage and animals

While executing these two great works, Ghiberti found time for others Among these were two fine bronze reliefs for the font of the baptistery of Siena (1417–27), representing episodes from the "Life of John the Baptist" Between 1432 and 1440 he also designed the bronze shrine of St Zenobius, in the cathedral of Florence, the front of which contains a beautiful relief of the "Saint Restoring a Dead Child to Life," and the back six angels in relief He also designed a grave slab for Leonardo Dati, who died in 1423, in Santa Maria Novella,

and two others in Santa Croce, all of which are much defaced by treading

Ghiberti's chief strength, however, was in relief work on a small scale Accordingly we find in him the most celebrated goldsmith of his day None of his works as a goldsmith survives, but in his second *Commentary* he himself mentions the principal examples In 1419 he made for Pope Martin V a mitre, covered with leaves of gold, among which were many different figures, and a cope button, adorned with a figure of Christ He made another mitre in 1439 for Pope Eugenius IV, containing precious stones worth 38,000 ducats and surmounted by figures of Christ and the Virgin with angels He also set an antique intaglio, belonging to Giovanni de' Medici, between the wings of a golden dragon crouching in a bed of ivy leaves

In statuary Ghiberti was less successful He executed but three statues in bronze, all of which adorned the façade of Or San Michele "John the Baptist" (1414) is the earliest example, quite in the style of the first portal, "St Matthew" (1420–22), cast with the aid of Michelozzo, looks like a Roman orator, 'St Stephen" (1428) is the finest of all, simple in treatment and graceful in line

Ghiberti also figured as an architect He is mentioned in the record of 1520 as an associate of Brunelleschi in building the cupola of the cathedral at Florence, but if we may believe Vasari, he solicited this position and perpetually annoyed his colleague by his endeavors to steal his plans Brunelleschi feigned illness, and Ghiberti's incompetency became apparent Whether or not this story be true, Ghiberti's *Treatise on Architecture*, which survives in manuscript form, certainly shows incompetency As a designer for glass painting, he had greater success Some of the finest glasses in the cathedral in Florence were carried out after his designs by Bernardo di Francesco, including those of the chapel of St Zenobius, the middle window of the façade, and one in the drum of the cupola. As a citizen of influence, Ghiberti was selected chief magistrate of Florence and presented by the signory with a farm near Settino, in recognition of his services as an artist He died Dec 1, 1455, and was buried in Santa Croce

His son and pupil, VITTORIO, was a sculptor and goldsmith of note, who assisted his father in the second door In 1454 he made a design for the tapestry of the tribuna of the Palazzo della Signoria and in 1478 a bronze reliquary for the cathedral Among Ghiberti's other pupils and assistants were Michelozzo, Lamberti, and Antonio Pollajuola

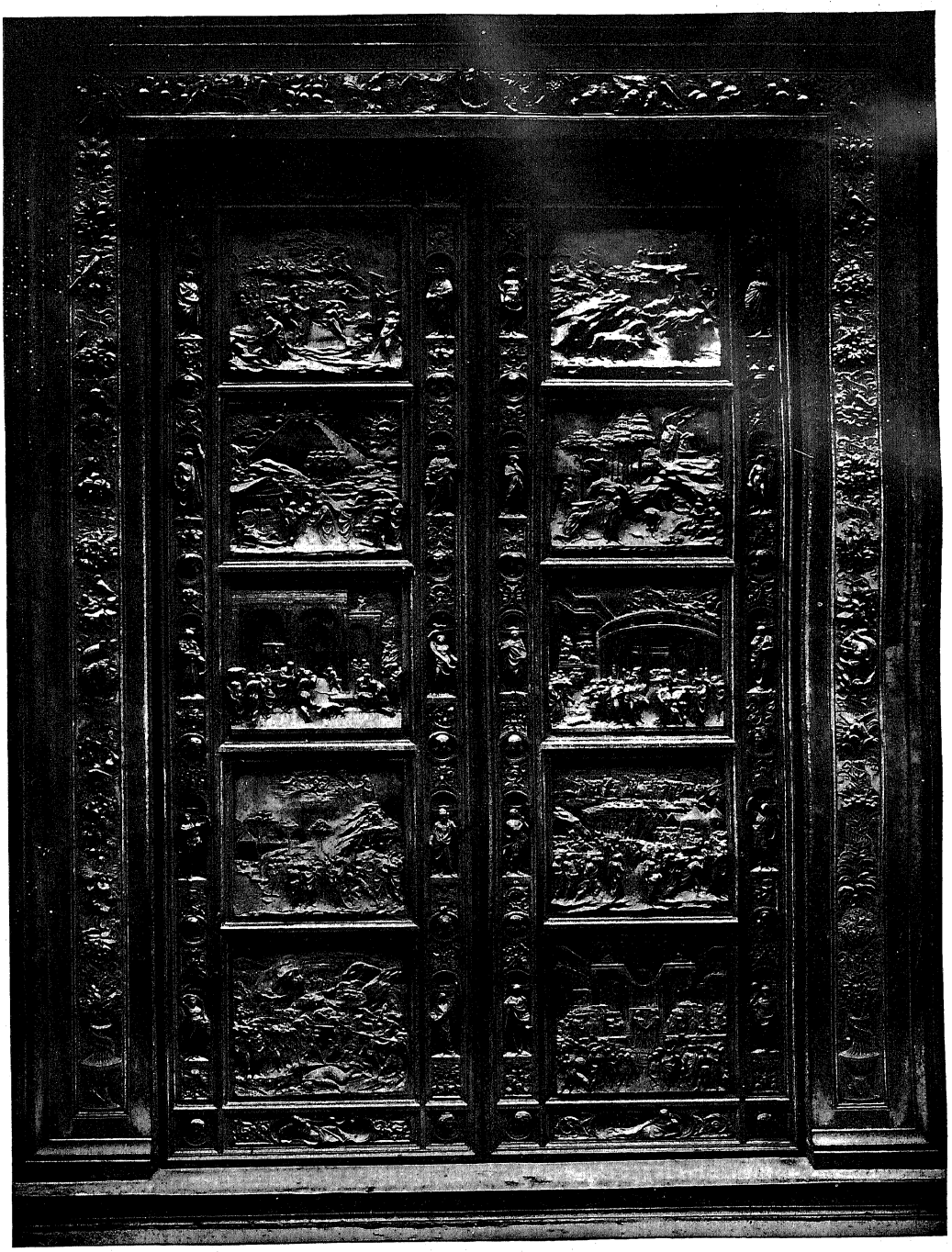
Bibliography. Ghiberti himself wrote a work, the *Commentarii*, or commentaries on the art of Florence, in which he did ample justice to himself It is preserved in manuscript form in the Biblioteca Magliabecchiana, Florence, and is best edited by Frey, *Sammlung ausgewahlter Biographien Vasaris* (Berlin, 1886), and by Schlosser (ib, 1912) The other chief source for his life is the biography in Vasari, *Lives of the Painters* (10 vols, New York, 1912) There is no satisfactory modern biography of Ghiberti Consult, however Perkins, *Tuscan Sculptures*, vol i (London, 1867); Scott, *Ghiberti and Donatello* (ib, 1882), Rosenberg, "Lorenzo Ghiberti," in Dohme, *Kunst und Künstler Italiens*, vol i (Leipzig, 1878), Perkins, *Ghiberti et son école* (Paris, 1897), Reymond, *La sculpture florentine* (Florence, 1898–99), Freeman, *Italian Sculpture of the Renaissance* (London, 1901), Venturi, *Storia dell' arte italiana*, vol vi (Rome, 1908)

GHIKA, gē'ka A princely family which gave a number of hospodars to Moldavia and Wallachia The founder of the house was George Ghika (1600–64), an Albanian by birth, who through the favor of his compatriot, the Grand Vizier Mohammed Kiuprili Aga, was raised to the dignity of Hospodar of Moldavia in 1658, and for a brief period (1660) was also Hospodar of Wallachia His son, Gregory Ghika, ruled in Wallachia from 1660 to 1664 and from 1672 to 1674 and received from the Emperor Leopold I the title of Prince of the Holy Roman Empire Of subsequent members of the family those calling for special notice are Alexander, Gregory, and Jon, though the family as a whole has been active in Rumanian affairs and always associated with the Liberal and Nationalist party

ALEXANDER GHIKA X (1795–1862) became Hospodar of Wallachia in 1834 He founded schools for primary instruction in every village, lightened the burdens of the peasantry, began the enfranchisement of the gypsies, and assisted in the organization of a national party known as Young Rumania Russia took alarm and gradually, under her influence, a twofold opposition was excited against him, on the part both of the extreme Liberals and of the old boyars or landed proprietors, who formed the Conservative party and were his personal enemies After many intrigues he was removed from his office in 1842 He died in 1862 Consult Bibesco, *De la situation de la Valachie sous l'administration d'Alexandre Ghika* (Brussels, 1842)

GREGORY GHIKA (1807–57) was one of the chiefs of the Liberal opposition in Moldavia under the Hospodar Michael Sturdza (1834–49), whose selfish policy was subservient to the designs of Russia In 1849 the Sultan appointed him Hospodar of Moldavia Hampered during a part of his tenure by the Russian occupation, he was able to accomplish much when freed from this impediment He organized a good police system, augmented the effective force of the militia, founded schools for superior and secondary instruction at Galatz, Hush, and elsewhere, promulgated an administrative code—the first great step towards the reform of abuses—increased municipal resources, and at his own expense built aqueducts and printed important historical manuscripts He brought about a radical reform of the penitentiary system, the abolition of serfdom (1855) and of the censorship of the press (1856), and the establishment of foreign merchant companies for the navigation of the Pruth and the Sereth (1856) He encouraged the growth of a spirit of unity among the peoples of Moldavia and Wallachia In 1856 Gregory was superseded in his office and went to reside in France He committed suicide, Aug 26, 1857, at Meudon He left three sons, the youngest of whom was Rumanian Minister to Constantinople and died in Paris in 1902

JON GHIKA (1817–97), a nephew of Alexander X, was born at Bucharest and after studying at Paris (1837–42) became, in the latter year, professor of mathematics and political economy at the University of Jassy Having become a member of the national party which opposed the establishment of Russian domination in Wallachia, he was one of the leaders of the



GHIBERTI

BRONZE DOORS OF THE BAPTISTERY, FLORENCE

revolution of June, 1848, which resulted in the overthrow of the Hospodar, George Bibesco He was sent by the short-lived provisional government as diplomatic representative to Constantinople, where his exceptional abilities gained him the favor of the Sultan, who in 1856 made him Prince of Samos He returned to Wallachia in 1857, served in the Ministerial Council under Prince Alexander John Cuza, and was twice Premier under his successor, Prince Charles of Hohenzollern (1866–67 and 1870–71) From 1876 to 1881 he was Vice President of the Senate From 1881 to 1889 he was Ambassador at London He died at Bucharest, May 4, 1897 Consult Dora d' Istria, *Gli Albanesi in Rumenia storia dei principi Ghika nei secoli XVII–XIX* (Florence, 1873)

GHIKA, HELENA See DORA D' ISTRIA.

GHILAN, or **GILAN,** gē-lan' A border province of Persia, occupying a narrow strip of land between the north slope of the Elburz Mountains and the Caspian Sea (Map Persia, C 4). Its area is estimated at 5000 square miles The coast land is swampy and overgrown with thick forests which wild and ferocious animals inhabit, while the southern part partakes of the character of the Elburz region The climate is moist and unhealthful The well-watered and fertile coast land produces rice, cotton, tea, tobacco, peaches, figs, and other southern fruits In the more elevated regions grain is grown and cattle are reared Silk and oil of roses are produced extensively The population, estimated at 200,000, is made up of the aboriginal Iranians, with Kurdish and Turkish immigrants They speak either a Persian dialect, termed Gileki, or Tat, which is a pure Iranian tongue In religion they are mostly Mohammedans and belong to the Shiite sect The principal town is Resht (q v)

GHILZÁIS, gēl-za'ēz A tribe of Pathan stock in eastern Afghanistan (q v), Aryan by language Consult Ratzel, *The History of Mankind* (3 vols , London, 1898)

GHIRLANDAIO, gēr'lan-da'yō A family of Florentine painters Their real family name was Bigordi, and the name Ghirlandaio or Grillandaio (garland maker) was first given to TOMMASO BIGORDI, a goldsmith, because of his skill in fashioning silver wreaths used in ladies' headdresses His son DOMENICO (1449–94), the chief member of the family, was born in Florence and brought up in his father's trade He studied painting and mosaic under Alesso Baldovinetti and was also influenced by Castagno and Verrocchio (q v). The earliest record of his activity is in 1475, when we find him employed in the Vatican library at Rome The works executed there have been lost His fresco "Call of Saints Peter and Andrew," in the Sistine Chapel, was painted in 1481–82 It is, perhaps, the best of the fifteenth-century paintings of the Sistine Chapel, being excellent in composition, with good landscape and perspective, the color is unattractive His frescoes in the Capella Fina, in the Collegiate Church of San Gimignano, treating the "Life of St Fina," were completed, for the most part, before 1475 They are especially remarkable for the modesty and grace of the female figures. The frescoes in Ognisanti, Florence, finished in 1480, show the painter fully developed Of these only two paintings survive, the "Last Supper" and "St Jerome" The former is probably the best representation of the subject painted in the fifteenth century and far excels his later fresco of the same subject in San Marco His "St Jerome" is a companion piece to Botticelli's "St Augustine" From 1481 to 1485 Domenico was occupied in the Palazzo Vecchio, Florence, which in point of historic decoration was long the rival of the Sistine Chapel at Rome Of all its frescoes only Ghirlandaio's survive, and of these the decorations of the chapel have been spoiled by restoration His "St Zenobius Enthroned" in the Sala dell' Orologio is a grand architectural composition

On Dec 15, 1485, he completed his masterpiece, the frescoes of the Sassetti Chapel in Santa Trinita, Florence The figures of the donor and his family on either side of the altar are comparable in the dignity of their realism with those of the Ghent altar by the Van Eycks (q v) The frescoes represent scenes from the life of St Francis and show the decided influence of the same subject by Giotto in Santa Croce The heads are nearly all portraits, and the scenes are set amid views of Florence This work is better in color and in technique than any other of his productions Then followed the frescoes in the Tornabuoni Chapel, Santa Maria Novella, finished in 1490, which, though lacking in decorative qualities and crowded in composition, are his most celebrated works Here, too, are figures of the donors, in lunette above is God the Father surrounded by the patron saints of Florence Below them are the "Annunciation" and the "Baptist" on either side, typifying the subjects of the frescoes represented, i e, the "Legend of the Virgin" and the "Life of John the Baptist" On the vaulted roof are frescoes representing the "Four Evangelists" The frescoes contain an almost incredible number of portraits in the fashionable contemporary costume of the day 21 of the Tornabuoni and Tornaquinci families, the donors, and among other celebrities of the day, Poliziano, Marsilio Ficino, and the fair Ginevra Benci

Domenico's easel pictures are not of equal importance, his art was more adapted to monumental fresco Among his chief easel pictures, all of which are painted in tempera, are the altarpiece of the Sassetti Chapel (1485), now in the Uffizi, "Coronation of the Virgin" (1486), in the Palazzo Publico, Narni, the circular "Adoration of the Kings" (1487), in the Uffizi, and the altarpiece of Santa Maria degli Innocenti representing the same subject The latter is one of his best works A dignified work is the "Virgin Enthroned," now in the Uffizi The altarpiece of Santa Maria Novella (1490) is divided between Berlin and Munich, and his last easel picture, "The Visitation" (1491), completed by David Ghirlandaio and Mainardi, is in the Louvre Mention should also be made of his portrait heads, of which the best known are those of an "Old Man and Boy," in the Louvre, Giovanni Bicci de Medici, in the Uffizi, Giovanna Tornabuoni, in the Morgan collection, New York, and several figures of popes

Domenico passed practically all his life in Florence, where he died Jan. 11, 1494. He was the painter par excellence of Florentine life His paintings are, in fact, genre in the guise of religion. His art represents the highest technical development of realism in the century He united in himself in a remarkable manner all the tendencies of Florentine art, ancient and

modern, Masaccio, even Giotto, having influenced him From the purely technical side he was one of the greatest painters that Florence ever produced Although somewhat lacking in originality, he excelled in composition, was a fine draftsman, and, for Florence, an excellent colorist, but he lacked the one thing essential to a painter of the highest rank, viz, genius

DAVIDE (1452–1525) and BENEDETTO GHIRLANDAIO (1458–97), brothers and pupils of Domenico, assisted their brother, but painted no independent works that survive The mosaic of the "Annunciation" over the first north portal of the cathedral of Florence is the work of Domenico and Davide Among Domenico's other pupils were his brother-in-law Bastiano Mainardi, Francesco Granacci (q v), and, for a brief time, Michelangelo.

RIDOLFO (1483–1561), son of Domenico, was 11 years old when his father died, but received his artistic education in his father's studio, which was conducted by Granacci and Davide Ghirlandaio He assisted the former in some of his works, but about 1503 he came wholly under the influence of Leonardo da Vinci (q v) and painted a number of excellent works, which are hardly to be distinguished from Leonardo's In fact, paintings formerly attributed to the latter, like the "Annunciation" in the Uffizi, the "Goldsmith" in the Pitti Palace, and the portrait of an "Old Man," in Palazzo Torregiani (Florence), are by Ridolfo His best works of this character are the "Coronation of the Virgin" (1503), in the Louvre, and the altarpiece of San Jacopo in Ripoli (1505), and the "Betrothal of St Catharine" Somewhat later he came under the influence of Raphael, as may be seen in his excellent portrait of an "Old Woman" (1509) in the Pitti Palace He is reputed by Vasari to have assisted Raphael in the draperies of the "Belle Jardinière," but to have refused an invitation by him to settle at Rome His most ambitious works are the "Coronation of the Virgin," the altarpiece of the cathedral of Prato, the "Virgin Adored by Saints," altarpiece of San Pietro Maggiore, Pistoia, and two scenes from the 'Life of St Zenobius," in the Uffizi. In later life his profession degenerated into a trade, he employed a large number of assistants, and his work became mannered and stiff

Bibliography. The chief sources are Vasari, *Lives of the Painters* (10 vols, New York, 1912); Crowe and Cavalcaselle, *History of Painting in Italy* (London, 1903), Egger, *Codex Escurialensis, ein Skizzenbuch aus der Werkstatt Domenico Ghirlandajos* (Vienna, 1906) The principal monographs are by Steinmann (Bielefeld, 1897); Hauvette (Paris, 1908), Davies (London, 1908) Consult also Layard, *Domenico Ghirlandajo and his Fresco of the Death of St. Francis* (ib., 1860)

GHISLAIN, gēs'lăn'. See MÉRODE, FRANÇOIS XAVIER

GHISLAIN, LOUIS ALBERT See BACLER D'ALBE

GHISLANZONI, gēs'lan-zō'nē, ANTONIO (1824–93) An Italian singer and author, born at Lecco. He was a singer in the Milan theatre, and when he lost his voice became a journalist, founded the satirical paper *L'Uomo di Pietra* (1857), and was editor of the *Gazzetta Musicale* He wrote a number of excellent opera librettos, among them that of Verdi's *Aida*, and several novels, including *Gli artisti da teatro* (1865) and *Le donne brutte* (1870).

GHIZEH, or **GIZEH,** gē'zĕ An Egyptian village on the left bank of the Nile opposite the island of Roda and about 3 miles from Cairo Although now fallen into decay, it is said to have once contained magnificent palaces which in later times the Mameluke princes used as a summer residence, and it was a place of some importance in the Middle Ages Near Ghizeh is the viceregal palace, originally built for a harem, which in 1889 became the repository of the great collection of Egyptian antiquities removed in that year from Bulak The collection has recently been transferred to Cairo The great pyramids (q v) lie about 5 miles west of Ghizeh For the work of the British School of Archæology at Ghizeh, consult Flinders Petrie, *Gizeh and Rifeh* (London, 1907)

GHIZNI, gĭz'nē See GHAZNI

GHO'GRA See GOGRA

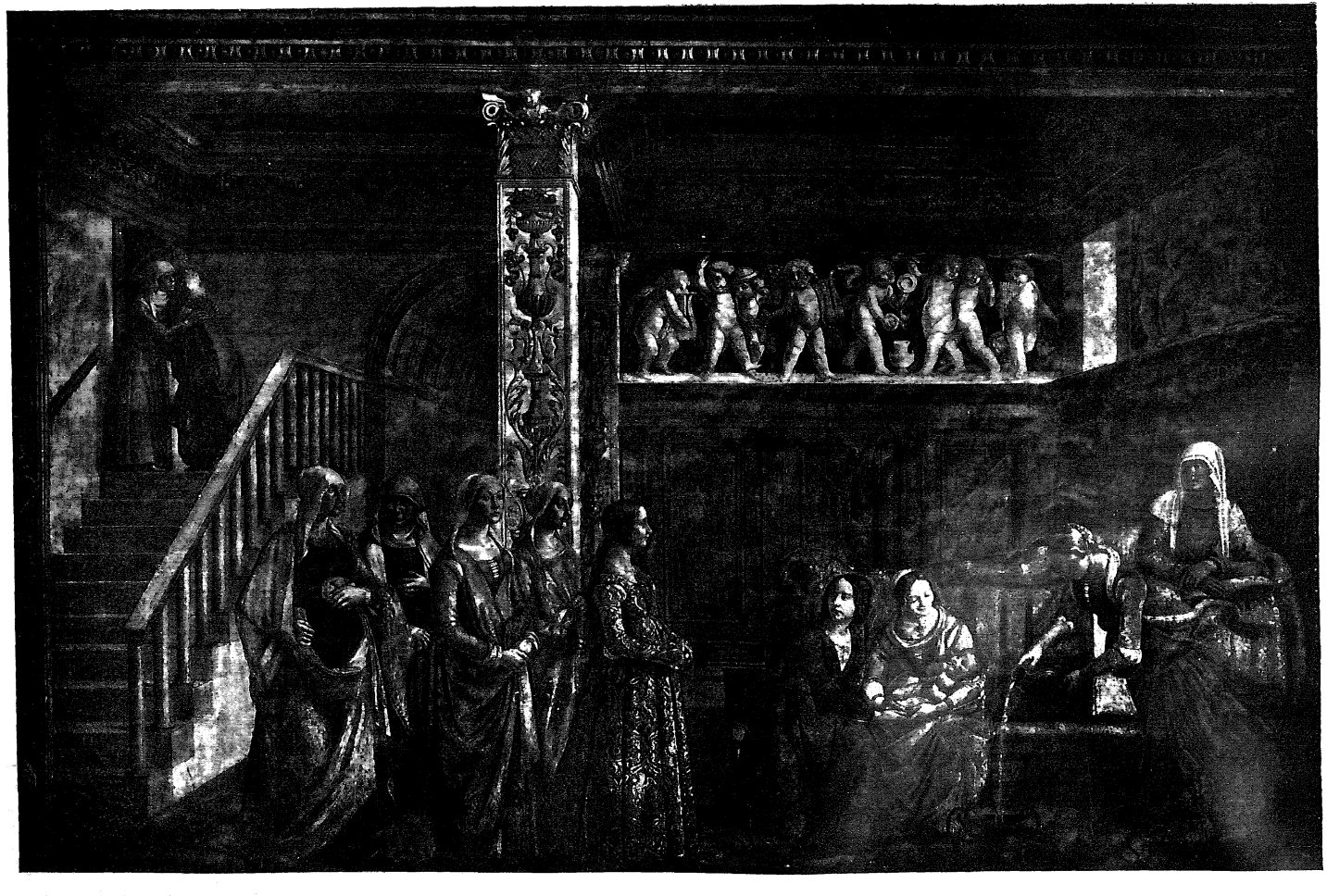
GHOR, gōr See EL-GHOR

GHORKAR, gōr'kar (Pers *gōrkhar*, wild ass) The name in western India and Beluchistan for the local variety of the Asiatic wild ass, which differs from the kiang in being somewhat paler, less reddish in color, and having a broader dorsal stripe See KIANG

GHOST DANCE. See WOVOKA

GHOST MOTH A moth (*Hepialus humuli*) very common in many parts of Great Britain, and of which the caterpillar, known as the "otter," often commits great ravages in hop plantations, devouring the roots of the hop It feeds also on the roots of the nettle, burdock, and some other plants This moth belongs to a family (Hepialidæ) often called swifts from their rapid flight The male ghost moth is entirely of a satiny-white color above, the female yellowish with darker markings, both sexes are brown on the underside They are to be seen flying about in the twilight, not unfrequently in churchyards, from which circumstance, and from the white color of the males and their sudden disappearance in the imperfect light, they derive their name The caterpillar, which is sometimes 2 inches long, is yellowish white, with scattered hairs. It spins a large cylindrical cocoon among the roots on which it has been feeding and there becomes a chrysalis The family is represented in North America by species harmful to the alder and other trees

GHOSTS (AS *gāst*, OHG *geist*, Ger *Geist;* ultimately connected with OIr *goet*, wound, Skt *hēdas*, wrath) The spirits of the dead as manifested to the living The belief in ghosts is one of the earliest of all religious phenomena and forms the foundation of many concepts and practices in cults from the most primitive faiths to the most highly spiritual It is found in one form or another at all ages and among all peoples To such an extent does belief in ghosts prevail that one school of comparative religion (see RELIGION, COMPARATIVE), of whom Herbert Spencer and Julius Lippert are the chief representatives, has sought to find the origin of all religion in ghost cults This view must be regarded, however, as an erroneous, because one-sided, theory, but the importance of ghost worship as a religious factor cannot be denied, and it is certainly one of the main sources of religious belief Its chief development is found in the widespread existence of ancestor worship, as will be explained It is also the foundation of all eschatology (q v), or belief in future life The notion of survival of a certain mysterious part of man, which may be called con-



GHIRLANDAIO

"NATIVITY OF THE VIRGIN MARY," FROM THE FRESCO IN THE CHURCH OF SANTA MARIA NOVELLA, FLORENCE

veniently the soul, is found at a very early stage in religious development Whether this belief is, and always has been, universal is a problem which may be insoluble While many observers deny the existence of ghost belief as well as of all religious concepts among certain extremely primitive peoples, as the Andaman islanders, a prudent skepticism renders one distrustful of their conclusions, for it may be stated as a general fact that religious beliefs are particularly liable to concealment and to misinterpretation This reticence may be due either to lack of method or to misunderstanding on the part of the investigator, or to a fear entertained by the individual questioned lest the knowledge gained from him may be used to his hurt

The ghost concept in its most primitive form seems to be developed as follows The phenomenon of dreams is one of the starting points According to the reasoning of the primitive mind, the self, while the body is unconscious and inert, wanders to places familiar or even unknown, experiences pleasure and pain, converses with friends perhaps dead, and performs other actions which have no connection with the body It is therefore a dangerous thing, in the belief of many savage tribes, to wake a sleeper suddenly, lest his soul may not return in time. Among some peoples the soul is even supposed to assume a visible shape, as that of a mouse, which comes from the sleeper's mouth From sleep and dreams the savage proceeds by analogy to death To him the distinction between slumber and death is one of degree rather than of kind, and it is well known how universal is the belief that sleep and death are near akin As in slumber the soul left the body for a time, but returned to it, so in the long sleep, as the primitive mind regards it, of death, the soul is supposed to remain near the body This belief, e g, is found even in such developed faiths as Parsiism and Mohammedanism, while other religions, as the ancient Egyptian, teach separate phases of the soul, one of which, like the Egyptian *ka*, remains near the corpse As it is obviously impossible to keep a corpse from dissolution, and as the progress of decay renders the body more and more uninhabitable for the spirit which has left it, the soul, or the ghost as it may now be called, becomes a source of much anxiety to the kinsmen and other friends of the dead It must be borne in mind as has been stated in the article on demonology (q v), that in primitive religion the element of terror is one of the most important factors and at first exercises a far greater influence than hope The ghost is, then, more terrible than was the man whose body it had animated. It is no longer limited by bodily restrictions, it can traverse space with infinite speed, and may be invisible Fortunately, and somewhat curiously, the ghost, like demons generally, is rather stupid and is also bound by certain limitations Upon such an apparently flimsy foundation, which is, however, logical to the primitive man, are built a complicated system of mortuary customs (q v.) and the concept of immortality The ghost, which, as has been said, delights to hover around its earthly home, is not a cheerful companion to the living and must therefore be kept away This is accomplished by various methods, as by building a new hut for the survivors, or, more easily, by carrying the corpse out by a hole broken in the side of the dwelling, which is subsequently walled up The ghost is then unable to find its way back, and the house is safe from its invasion. The superstition here noted still survives The so-called haunted houses and haunted rooms are cases in point and it is important to note that it is the malignant ghosts, chiefly those who have been involved in murder or other evil acts, which especially linger around the scene of their earthly activities The beneficent ghost plays but a small part as compared with the maleficent one To avert the influence of maleficent ghosts, who have already been considered under the title "demonology" (q v), various forms of sacrifice and magic are employed These ceremonies have as their primary object the satisfaction of the ghost's wants These needs are conceived as being practically the same as they are on earth Thus, the bow and arrows are laid with the warrior, a woman's jewelry is buried with her, and a child's toys rest beside its body It was also common in many places, notably in Dahomey and Polynesia, to sacrifice slaves to attend their master in the spirit world, while among the ancient Germans horses and even wives (as in the Indian suttee) were often slain at the funeral pyre It is also probable that to the wish to appease ghosts many of the elaborate mourning customs of primitive peoples may be traced Under this category come such acts as shaving the hair, cutting the flesh, fasting, neglect of the toilet, use of unbecoming clothing, and the like It is, of course, true that at a comparatively early time the development of civilization rendered mourning for the dead an act of affection and not of fear, but it is hard to believe that the savage who put to death the aged members of his tribe was moved by any high ideals in the beginning of mortuary customs In line with mourning are the offerings of food, drink, clothing, and, as in China, of money to the deceased

Thus is evolved one of the most widely spread of all cults—ancestor worship Gradually beside the malignant ghost the benignant one appears, and by a process quite as natural The interest which the father during his lifetime feels in his family is logically continued after his death, when the social life becomes more stable It is also proper that his sons should be the ministers of this cult, and this explains the imperative necessity felt among many peoples for sons If a man dies sonless, his ghost will lack care, and the ancestor cult therefore exercises a far-reaching influence on early family life As already noted, however, this worship has its limitations Even among civilized races, except in the comparatively rare instances where genealogical tables are constructed, men seldom know the names of their ancestors further back than the fourth generation Translating this into terms of primitive life implies that the ghosts of remote ancestors perish, or become absorbed into a vague spirit world This leads to the conclusion that all men do not necessarily become ghosts, or at least have but an evanescent ghosthood It may be stated as generally true that only those men survive after death as ghosts who have been so remarkable for some reason or other as to command special attention while living This is clearly shown by the development of the immortality concept in Judaism (See ESCHATOLOGY.) Not in ancestor worship alone does the ghost play an important part Many phenomena in nature worship (q v) and in the various aspects of totem

ism (q v), including tree worship and serpent worship, are explicable only by the ghost cult On the other hand, ghost worship is deeply influenced by magic (q v), especially in the evolution of the concept of the benignant ghost, to which allusion has already been made Magic is, in its simplest terms, a means of control over supernatural powers As the belief in magic increases, and as by implication its power increases, the ghost becomes less and less an object of fear, and in the same degree becomes more and more a beneficent spirit, until it is evolved in many instances into a guardian angel or some like concept In this way the ghost idea may be traced from the primitive belief in life after the death sleep, the care for such life and the avoidance of its ill will, the superhuman and generally malignant nature of that life, and its evanescence in the lapse of years, down to the benignant ghost, controlled at first by magic, which often acts as a guardian spirit, while the immortality concept, at first individual and temporary, finally becomes universal and eternal

Consult: Spencer, *Principles of Sociology* (3d ed, 2 vols., London, 1885), Campbell, *Notes on the Spirit Basis of Belief and Custom* (Bombay, 1885), Jastrow, *The Study of Religion* (New York, 1902), O'Donnell, *Ghostly Phenomena* (London, 1910), See also DEMONOLOGY, ESCHATOLOGY, MAGIC, MORTUARY CUSTOMS, RELIGION, COMPARATIVE, SUPERSTITION, TOTEMISM, PSYCHICAL RESEARCH

GHOSTS One of the most thrilling and powerful of Ibsen's dramas (1881) It shows the consequences of inherited evil, the ghosts that return, and gives a gloomy picture of the inevitableness of fate Oswald Alving, son of a vicious father, whose past had been concealed, lapses into idiocy at the end, after entreating his mother to poison him when the foreseen doom shall have overtaken him.

GHURI, gōō'rē A Mohammedan dynasty which received its name from Ghur, a rugged district of Afghanistan Ten monarchs are included in this line, and their power lasted from about 1148 to about 1215 AD In 1148 ALA UD-DIN HUSAIN and his brothers, SAIF UD-DIN SURI and BAHA UD-DIN SAM, attacked and captured Ghazni (see GHAZNIVIDES), which was placed under Saif ud-Din This prince was defeated by Bahram, Shah of Ghazni, in the following year and was hanged He was succeeded by Baha ud-Din as ruler of Ghur, who died within the year, and was followed in turn by Ala ud-Din, the "World-burner," who again captured Ghazni in 1155 His path was marked by slaughter and destruction, the only thing he was said to have spared in the city being the tomb of Mahmud, the idol of Moslem soldiers He died in 1161 and was succeeded by his son, SAIF UD-DIN MOHAMMED, who was followed two years later by his cousin, GHIYAS UD-DIN In 1173 the most famous prince of the line, MOHAMMED GHURI, who was to be the conqueror of northern India, captured Ghazni, which had been lost, and began his career as a warrior He took Lahore from Khusru Shah, the last of the Ghaznivides, in 1179, and captured it again seven years later Mohammed's early attempts to conquer India were not successful, and he was severely defeated by the Rajah of Delhi and Ajmere, at Narain, between Delhi and Ambala, in 1191. In the following year the tables were turned, the Rajah was defeated and captured near the scene of his previous victory and put to death In 1193 Delhi was captured, and the first, or Turkish, dynasty of Delhi Sultans was founded there by MOHAMMED GHURI The Sultan continued his conquests, defeating the Maharajah of Kanouj in 1194, thus extending his dominion beyond Benares Within 10 years his slave, Qutb ud-Din, had reduced Gujarat and Mohammed Bakhtyar had subdued Oudh, Behar, and Bengal In 1206 Mohammed Ghuri, who kept his court at Ghazni in Afghanistan, was assassinated while asleep in his tent on the banks of the Indus and was succeeded by his nephew, GHIYAS UD-DIN MAHMUD As so often happened at the death of an Oriental conqueror, the Empire was broken up, and the dead Emperor's slave, QUTB UD-DIN, was crowned Emperor of Delhi at Lahore and began a career of conquest, extending his sway to the Brahmaputra River The reigns of the Ghuri dynasty after Mohammed, comprising GHIYAS UD-DIN MAHMUD (-1206–10), BAHA UD-DIN SAN (1210), ALA UD-DIN UTSUZ (1210–15), and ALA UD-DIN MOHAMMED (1215), are entirely without interest Consult Lane-Poole, *Mediæval India under Mohammedan Rule* (London, 1903)

GHYCZY, gī'tsĭ, KÁLMÁN (1808–88) An Hungarian statesman, born at Komorn He was elected to the Diet in 1843 and in 1848 appointed Undersecretary of State to Deák in the Ministry of Justice, succeeding him as Minister in September of that year In 1861 he was elected a deputy and became President of the House In 1865 with Tisza he formed the Left Centre party He opposed the compromise of 1867 with Austria, but in 1874 accepted the appointment of Minister of Finance in the Bittó ministry He was again chosen President of the House of Deputies in 1875, but retired from public life in 1879

GIACOMELLI, zhä'kō'mĕl'lē, HECTOR (1822–1904) A French illustrator, engraver, painter of birds and insects, and collector He was born in Paris of Italian parentage He was a draftsman of exceptional talent, and his drawings and water colors (gouaches) of birds, insects, and flowers, which were his specialty, have rarely been equaled in delicacy of execution and poetic charm Among the most celebrated of these are his illustrations for Michelet's *L'Oiseau* (1867) and *L'Insecte* (1876), for Theuriet's *Sous bois* (1883) and *Nos oiseaux* (1887), besides several original suites for magazines, and his series of initials and marginal drawings, in particular for the Doré Bible He published in 1862 *Raffet, son œuvre lithographique et ses eaux-fortes* Giacomelli possessed one of the finest existent collections of nineteenth-century prints

GIACOMETTI, jä'kō-mĕt'tē, PAOLO (1816–82) An Italian dramatist, born at Novi Ligure He studied law in Genoa, after the success of his play *Rosilda* became a playwright and wrote more than 80 works of varying seriousness and literary value For several years he was author to a strolling troupe of players, under contract to supply yearly a fixed number of plays His most important drama is the tragedy *Sofocle* (1860) The larger number of them, all rapidly written, are built around a moral or political theme Mistori, Rossi, and Salvini made many of them great successes. His *Works* were published in Milan (8 vols, 1859–66)

GIACOMOTTI, zhä'kō'mō'tē', FÉLIX HENRI (1828–1909) A French historical and portrait

painter, born at Quingey (Doubs) He studied at the Ecole des Beaux-Arts and under Picot In 1854 he won the Prix de Rome Besides religious and principally mythological subjects, both of which he treats with equal finish and grace—the latter often with a touch of sensuality—he also painted excellent portraits His principal works include "The Rape of Amymone" (1865, until recently in the Luxembourg Museum), "Agrippina Leaving the Roman Camp" (1864, Lille Museum), "Christ Blessing the Children" and "Christ in the Temple" (both in Saint-Etienne du Mont, Paris), "Apotheosis of Rubens and of Painting" (1878, ceiling piece in the Luxembourg), "Centaur and Nymph", decorative painting in the chapel of St Joseph, Notre Dame des Champs, Paris, portraits of Edmond About and the Princess Montholon (Rouen Museum)

GIAFAR, ja'far The companion of Harun-al-Rashid, the Caliph of Bagdad, in the *Arabian Nights*

GIANIBELLI, ja'nē-bĕl'lē, or **GIAMBELLI,** Federigo (c 1530–?) A famous military engineer He was born at Mantua and, after serving for some time in Italy, proceeded to Spain and offered his services to Philip II, but abruptly quitted Madrid, and after residing some time at Antwerp, where he acquired a high reputation as a mechanician, passed over to England and entered the service of Queen Elizabeth, who granted him a pension During the War of Independence in the Netherlands, Alexander, Duke of Parma, generalissimo of the Spanish forces, laid siege to Antwerp in 1584, whereupon Elizabeth commissioned Gianibelli to proceed to the assistance of the inhabitants On his arrival he found that the Spaniards had built a vast bridge across the Scheldt, interrupting all communication with the sea, by which alone the city could get provisions or help Early in 1585 Gianibelli carried out a plan for blowing up the structure by floating down rafts laden with vast quantities of explosives against it, which were to be set off by means of a mechanical contrivance The ponderous structure was partially blown into the air, and 1000 men—among whom were some of the best Spanish officers—were killed This achievement, however, was rendered unavailing by the failure of the Dutch admiral to relieve the town, and by the wonderful energy of the Duke of Parma, as well as the want of unity among the citizens, and Gianibelli was obliged to return to England Here he was employed at the time of the threatened Spanish invasion in fortifying the coast line and the Thames, which he did in a very skillful manner When the Armada appeared in the Channel, it was Gianibelli who proposed and carried out the plan of sending fire ships into the midst of the enemy, who remembered too well Gianibelli's "hell burners" of Antwerp to await their coming, and fled Gianibelli died probably in London The date of his death is not known

GIANNI, jan'nē, Lapo dei Ricevuti An Italian poet of the thirteenth century, a citizen of Florence and a notary He was the friend of Dante and Guido Cavalcanti, and one of those who perfected the "sweet new style" of idealistic love poetry Although a minor poet in the group, his work is marked by warmth of feeling and vigor of imagination Of his verse there remain 12 ballate, two canzoni, and a doubtful sonnet Consult G. Tropia, *Rime di Lapo Gianni* (Rome, 1872), Rossetti, *Dante and his Circle* (London, 1874), Gabrielli, 'Lapo Gianni e la lirica predantesca," in *Rassegna italiana* (Rome, 1887), E Lamma, *Rime di Lapo Gianni* (1895)

GIANNONE, jan-nō'nā, Pietro (1676–1748). An eminent Italian historian, born May 7, 1676, at Ischitella, in the Neapolitan Province of Capitanata He early distinguished himself as a lawyer at Naples and soon accumulated sufficient means to enable him to devote considerable time and energy to historical research Early in life he had conceived the idea of writing a history of the Kingdom of Naples, and now in his villa adjoining Naples he labored for 20 years at this, his greatest historical work, which he published in 1723 in four volumes, under the title of *Storia civile del regno di Napoli* This valuable and comprehensive work not only treats of the civil history of the kingdom, but also contains learned and critical dissertations on the laws and customs and the administrative history of Naples, from the most remote times, tracing the successive working of Greek, Roman, and Christian influences on the legislative and social institutions His severe strictures on the spirit and practices of the modern Roman Catholic church so enraged the ecclesiastical party that Giannone was denounced and anathematized by the church The fanaticism of the lower classes was aroused by the calumnies leveled at the writer, who was finally excommunicated by the Archbishop of Naples and forced to take refuge first at Venice and later at Vienna and other places His history was condemned as heretical and libelous by the Pope and put on the Index Giannone, however, was granted a small pension by the Emperor Charles VI In 1734 he was deprived of this income and removed to Venice, whence he was expelled after being favorably received at first and forced to seek shelter in Geneva There he composed his famous diatribe, entitled *Il triregno,* against the papal pretensions, and proclaimed his adoption of Calvinistic doctrines Shortly after, an emissary from the court of Turin induced Giannone to enter the Sardinian States, where he was immediately arrested, and conducted to the fortress of Turin He passed the long years of his prison life in the pursuit of his chosen studies and retracted his change of religious opinions (1738), a step which in no way improved his condition He died a prisoner in the fortress, March 7, 1748, after an incarceration of 12 years His *Opere postume* (Lausanne, 1760) and his *Opere inedite,* edited by Mancini (Turin, 1859), complete the list of his historical works An English translation of his *History of Naples* appeared in London (1729–31). Consult Pierantoni, *Autobiografia di Pietro Giannone, i suoi tempi e la sua prigionia* (Rome, 1890), and Giannone, *Lo spiatto di Pietro Giannone da Venezia* (ib, 1892)

GIANNOTTI, jan-nōt'tē, Donato (1492–1573) An Italian historian, born in Florence. He grew up in the Republican régime which followed the flight of the Medicis from that city (1494). Upon their return (1530) he left Florence and lived most of the remainder of his life in Venice in the service of Cardinal Ridolfi, in France attached to the suite of Cardinal de Tournon, and in Rome as secretary of briefs (1571). He resembles Machiavelli in his thought and has the merit of having exactly described the forms of the governments about him and of having examined them more critically than other historians of his time. The most im-

portant of his works are *Della republica de Venezian* (1540), *Della republica fiorentina* (1721), *Vita di Niccolò Capponi* (1620), *Discorso delle cose d' Italia* His *Opere politiche e letterarie* were published with a biography by Vannucci (Florence, 1850) Consult Tassin, *Giannotti, sa vie, son temps et ses doctrines* (Paris, 1868), and Sanesi, *La vita e le opere di Donato Giannotti* (Pistoia, 1899)

GIANT DESPAIR See DESPAIR, GIANT

GIANT FAIRY FLOWER See COOPERIA

GIANT KILLER See JACK THE GIANT KILLER

GIANT KNOTWEED. See SACHALINE

GIANT, or SPEAR, LILY (*Doryanthes excelsa*) An Australian plant of the family Amaryllidaceæ, with flowering stem 10 to 14, sometimes 20 feet high, bearing at top a cluster of large crimson blossoms The stem is leafy, with the largest leaves near the root This plant is found both on the mountains and along the seacoast of New South Wales and Queensland It is of splendid beauty The fibre of its leaves has been found to be excellent for ropes Other species, as *Doryanthes palmeri* and *Doryanthes guilfoylei*, are fibre plants of similar habit They yield a large quantity of white elastic fibre that is especially adapted to cordage, mats, etc It has also been successfully used for making paper

GIANT LILY

GIANT POWDER See EXPLOSIVES

GIANTS (OF *geant, jaiant*, Fr. *géant*, from Gk *γίγας, gigas*, giant) Adult human beings over normal size In each race of mankind there is a standard of average height for men and for women, and this rule extends to castes and crafts as well as to civic and urban populations This shows how much more powerful the race has become than the individual Tall parents often have short children, and vice versa, but the breed is uniform The following table will show the average stature of men among the so-called gigantic races

Race	Height in inches
Scottish, of Galloway	70 5
Scottish in general	69
Livonians	69
Irish	68 5
Norwegians	68 5
English	67 5
Polynesians	68–69
Sikhs, Punjab	68
Fulahs of Sudan	69
Kafirs	68
Cheyennes	69
Patagonians	69

Between the Akkas, a dwarfish negro people in the forests of Central Africa (height, 53 inches), and the Scottish farmers of Galloway, there is a difference of 17 5 inches, and this difference is about the same as that between the average height of the whole human race and the tallest giants The Wahuma of East Africa are credibly reported to average 72 inches or more in height, and statures of 78 inches certainly occur among them with remarkable frequency, however, no exact statement can be made as to their mean height until the publication of Dr Czekanowski's measurements

The question is still mooted among ethnologists whether these differences in racial stature are due to nature or to nurture Doubtless both causes have always been at work It was believed among the ancients that the first men on the earth were tall and mighty and that they degenerated both in vigor and longevity In contrast with this is the attempt to prove that the first men were dwarfish, and that the modern races of short stature are only survivals of the first men living on the outskirts of civilization

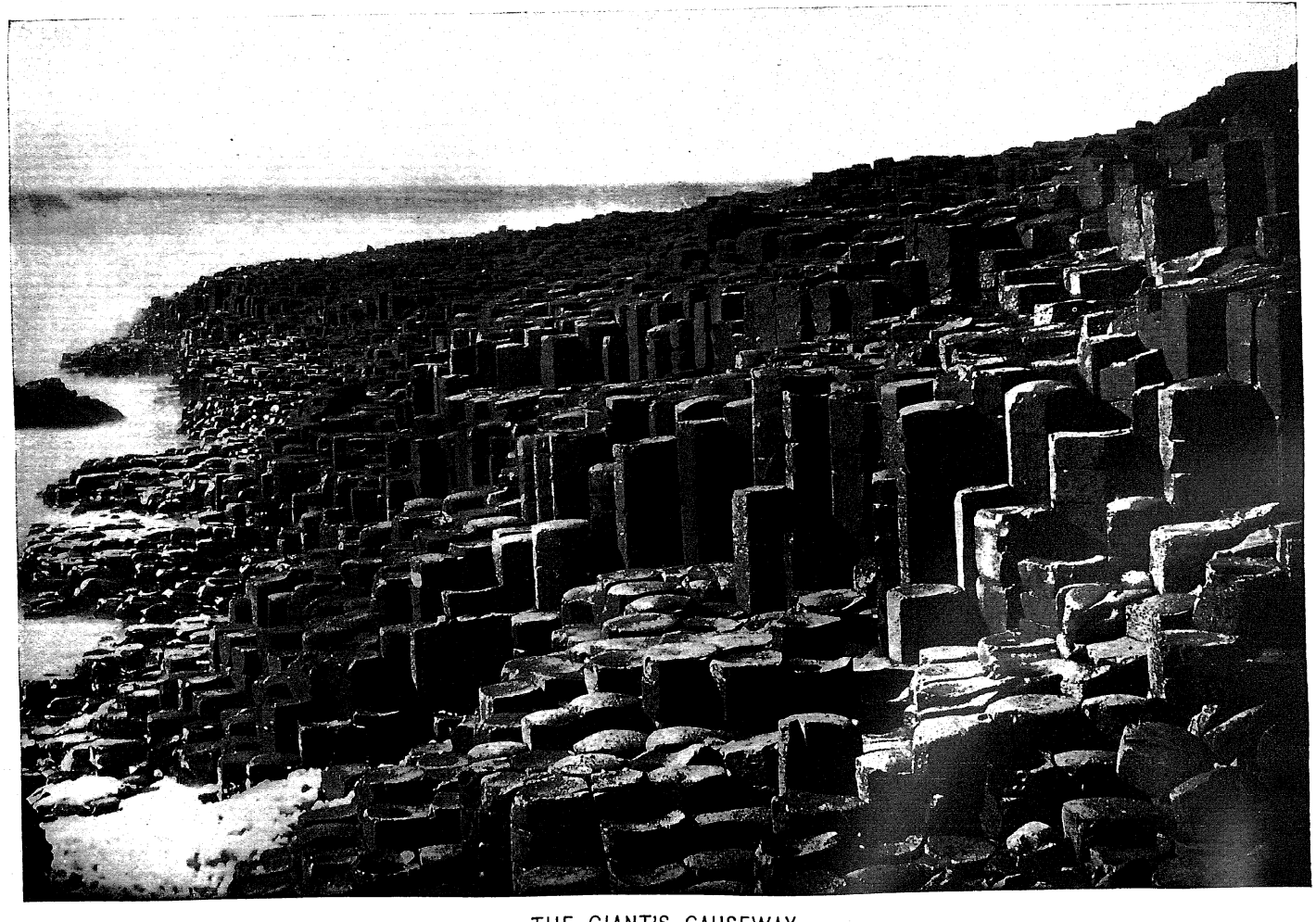
The term "giant" is applied also to abnormally tall individuals among the different peoples of the earth For convenience' sake it has been restricted to individuals above 200 centimeters (79 inches) in height Stories are common among the lower civilized peoples, as well as among savage tribes, to the effect that men have lived who measured 15 feet in height Og, King of Bashan, is said in Deuteronomy (iii 11) to have been the last of the giants His bedstead of iron was 9 cubits, or between 11 and 13½ feet, in length Pliny mentions the name of an Arabian giant who measured 9½ feet and also speaks of two others who were 10 feet in stature Allowance is to be made, as in all other cases, for the imagination of the narrator The following list of men whose real height is well known shows that it is possible for individuals to go far beyond the average of the human species, which is 65 inches

	Inches
Magrath, Bishop Berkeley's giant	92
Patrick Cotter (1761–1804) or O'Brien	99
Charles Byrne, Irish giant	100
Topinard's Kalmuck	100
Winkelmaier, Austrian (died 1887)	103
Topinard's Finlander	112

It is conceded on the part of medical men who have studied the subject with great care that men of extraordinary stature have feeble viability Gigantism is often associated with acromegaly (q v), but is most frequently produced by excessive growth Bishop Berkeley's experiment is interesting in this connection, since the excessive height of the man was due to special feeding Natural giants or dwarfs, however, are abnormal, accompanied with sterility and other weaknesses

The word "giant" does not always refer to persons of tall stature or large size, but in mythology and folklore the title is given to men of great strength or speed or prowess It is these physical heroes that form the connecting link between the mythic world and the world of sense It is only a short distance across a narrow boundary to the province of the Jotuns and Titans and other giants of the imagination The Nephilim and Goliaths of the Bible are only a little way from Heracles and Typhoeus. The Cyclops Polyphemus has his legendary parallels among all peoples.

It has been suggested that the old-time and still-existing belief that mankind has degenerated, the excavation of great fossil bones in the superficial layers of the earth's crust, the discovery by explorers in the last four centuries of



THE GIANT'S CAUSEWAY
COUNTY ANTRIM, IRELAND

the taller races of the earth, whose height was exaggerated by the terrors of being in a strange country—all these combined to fix the belief in the real existence of gigantic races

Giants in Greek mythology are variously conceived, either as the sons of Gæa, Earth (Hesiod), or as a wild race of aborigines of enormous stature and proportionate strength (Homer) But neither poet refers to that tremendous conflict between the giants and the gods which, though subsequent to the overthrow of the Titans by Zeus, was often confounded with it Their mother Earth had made them proof against all weapons of the gods, and their final defeat was due to the prowess of a mortal, Heracles They were struck down and buried under islands and mountains, especially volcanoes The Enceladus and Typhoeus are associated with Etna In the colossal sculptures of the altar at Pergamum, in Asia Minor, the greatest representation of the *Gigantomachia* in ancient times, the giants appear in various shapes, some human, some monstrous, snake-footed, and winged

The tradition about the Cyclops shows similarly diverse forms The earliest legend makes them three in number, sons of Heaven and Earth, belonging to the race of the Titans, and yet helpers of Zeus in his struggle against their family Each of them had one round eye in the centre of his forehead, and this element appears to be constant in the changing phases of the myth In the *Odyssey*, however, they are gigantic and lawless shepherds living in Sicily, whose fertile soil produced for them of itself the fruits of the field They were cannibals as well, and scoffers at Zeus Polyphemus is described as the strongest among them and loses his single eye in the encounter with Odysseus Later they become the assistants of Vulcan at his forge under Etna, or on the Liparian Islands, and tradition ascribed to them the work, equally suitable to their great strength, of building the massive walls of Argos, Tiryns, and Mycenæ

Consult Taruffi, *Della macrosomia* (Milan, 1879), Bollinger, *Ueber Zwerg- und Riesenwuchs* (Berlin, 1884), Weinhold, *Die Riesen des germanischen Mythus* (Vienna, 1858), Meyer, *Die Giganten und Titanen in der antiken Sage und Kunst* (Berlin, 1887) See further bibliography in the *Index Catalogue of the Surgeon-General's Library* (Washington), under "Dwarfs and Giants", Tylor, *Early History of Mankind* (London, 1878), id, *Primitive Culture* (ib, 1891), Launoy and Roy, *Etudes biologiques sur les géants* (Paris, 1904), Wohlgemuth, *Riessen und Zwerge in der altfranzosischen erzahlenden Dichtung* (Tubingen, 1906), Ranke, *Der Mensch* (Leipzig, 1912)

GIANTS, BATTLE OF THE A term used of the battle of Melegnano (Marignano), fought on Sept 13–14, 1515, between the allied French and Venetian armies and the Swiss allies of the Duke of Milan, in which the latter were defeated The name originated with Trivulzio, who said that the 18 battles which he witnessed were as child's play compared with this combat of the giants See MELEGNANO

GIANT'S CAUSEWAY. A promontory on the coast of Antrim in the north of Ireland A great outpouring of basalt took place here in the Tertiary period, and the edge of the intruded rock masses was subsequently dissected by erosion, leaving a line of perpendicular cliffs, some of which are 500 feet high Upon cooling the basalt assumed a columnar structure, to which is due the characteristic appearance of the Causeway The close-fitting columns have geometrical outlines, usually hexagonal, and are divided into sections of equal length that articulate by means of convex and concave joints The diameter of the columns ranges from 20 to 30 inches The Causeway is divided into three portions—the Little Causeway, the Middle Causeway, and the Grand Causeway The last has a width of from 60 to 120 feet and extends out to sea for about 500 feet, forming a natural platform which can be traversed on foot Many of the neighboring cliffs exhibit the same columnar structure One group of columns, from its peculiar arrangement, has been named the Saint's Organ There are many other interesting and picturesque localities in the vicinity, including the Amphitheatre, surrounded by cliffs 350 feet high, Chimney Point, a lofty mass of rocks, and Pleaskin Head In this vicinity the castles of Dunseverick and Dunluce, now in ruins, are perched on the top of isolated crags

GIANT'S DANCE An old name (*Chorea gigantum*) for Stonehenge, suggested by a legend concerning that place, which was later superseded by a second tale, related by Geoffrey of Monmouth, causing the old name to fall into comparative disuse See STONEHENGE

GIANTS' KETTLES A popular name for deep cavities or potholes occurring in surface rocks They are common in the glaciated regions of North America and Europe, especially on the coast of Norway, and are formed at the present time beneath the glaciers of the Alps During the summer months the melting ice gives rise to glacial streams that run down the surface and escape into the crevasses The erosive powers of the moving waters, carrying sand and stones, are directed by the ice passages against the rocky floor, into which deep cavities are worn Giants' kettles are formed also in nonglaciated regions by waterfalls and rapids, wherever streams move over rocks with sufficient velocity and carry along the necessary cutting materials Although they are commonly only a few feet in diameter or in depth, they occasionally attain much larger sizes, at Little Falls, N Y, the Mohawk River has carved out in a hard syenite kettles that measure from 50 to 75 feet across

GIANTS OF GUILDHALL See GOG AND MAGOG

GIAOUR, jour A Turkish word, corrupted from the Arabic *kāfir* (unbeliever), and applied by the Turks to all who reject Mohammedanism, especially to European Christians Though at first used exclusively as a term of reproach, its signification has been since modified, and now it is frequently employed merely as a distinctive epithet Sultan Mahmud II forbade his subjects to apply the term "Giaour" to any European See GHEBERS

GIAOUR, THE A narrative poem by Lord Byron, published in May, 1813 Originally only 400 lines in length, it was enlarged the same year to 1400 It is a fragment of a Turkish tale of a slave, Leila, who was thrown into the sea Her murder was avenged by her lover, a young Venetian, the Giaour of the title It contains the well-known lines on Greece, beginning, "He who hath bent him o'er the dead"

GIARRE, jar'rā A rapidly growing city in Sicily, on the eastern slopes of Mount Etna,

three quarters of a mile west of its port, Riposto, and 18 miles north of Catania (Map Italy, E 6). The commercial importance of Giarre is due to its exquisite wines Pop (commune), 1901, 26,000, 1911, 21,611

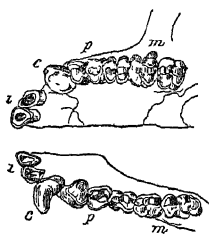
GIAVENO, ja-vā'nō A city in north Italy, on the left bank of the Sangone, 20 miles west of Turin It markets fruit, wine, potatoes, mushrooms, chestnuts, wood, and coal, and has cotton and jute factories Pop (commune), 1901, 10,795, 1911, 11,756

GIB, gĭb, ADAM (1714–88) A Scottish antiburgher leader He was born at Castletown, Perthshire, April 7, 1714 He entered the University of Edinburgh, and while still an undergraduate cast his lot with Ebenezer Erskine (q v) and others of the Secession church (See PRESBYTERIANISM) He was licensed to preach in 1740 and the following year was ordained minister of the large Secession congregation of Bristo Street, Edinburgh, where he soon attained a position of prominence In 1742 he caused some stir by the publication of an invective entitled *A Warning against Countenancing the Ministrations of George Whitefield,* and in 1745 he was almost the only minister of Edinburgh who continued to preach against rebellion while the troops of Charles Edward were in occupation of the town When the dispute concerning the burgher's oath broke out in 1747 (see BURGHER AND ANTIBURGHER), Gib became a leader of the minority in the antiburgher synod It was chiefly due to his influence that it was agreed by this ecclesiastical body to summon to the bar their burgher brethren and finally to depose and excommunicate them for contumacy From 1753 (when, after protracted litigation, he was compelled to leave the Bristo Street Church) till within a short period of his death, he preached regularly in Nicolson Street Church, which is said to have been filled every Sunday with an audience of 2000 persons. He died in Edinburgh, June 18, 1788 Among his works were *The Present Truth, a Display of the Secession Testimony* (1774), *Sacred Contemplations* (1786); and many other works dealing with the Secession Consult McKerrow, *History of the Secession Church* (Edinburgh, 1848)

GIBARA, hē-ba'ra An important seaport town of Cuba, situated on the north coast of the Province of Santiago de Cuba, about 25 miles north by east of Holguin, with which it is connected by rail (Map Cuba, J 5) It has a fine harbor, protected by a fort at the entrance, and carries on a large trade in fruit, especially bananas, and corn The vicinity produces also tobacco, sugar, and coffee, and is engaged to some extent in stock raising Timber is abundant in this region. The town has military and civil hospitals Pop, 1907, 6170

GIBBES, gĭbz, ROBERT WILSON (1809–66) An American historian and scientist, born in Charleston, S C He graduated in 1827 at South Carolina College (Columbia) and in 1830 at the Medical College of South Carolina (Charleston) and from 1827 to 1835 was assistant professor of chemistry, geology, and mineralogy in the former institution In 1852–60 he edited the *Weekly Banner* and the *Daily South Carolinian,* and twice he held office as mayor of Columbia During the Civil War he was surgeon-general of South Carolina At the burning of Columbia, in 1865, he lost valuable collections of minerals and fossils In addition to many medical articles in various periodicals, notably one on "Typhoid Pneumonia" in the *American Journal of the Medical Sciences* (1842), and a volume *Cuba for Invalids* (1860), he published a *Documentary History of the American Revolution, Consisting of Letters and Papers Relating to the Contest for Liberty, Chiefly in South Carolina* (3 vols, 1853–57)

GIBBON, gĭb'ŭn (Fr, of unknown origin) An East Indian anthropoid ape of the subfamily Hylobatinæ, the more generalized of the two families of the higher apes, the other being Pongidæ and including the orangs, gorillas, and chimpanzees The gibbons are of a smaller size and more slender form than the simians, and their arms are so long as almost to reach the ground when the animal stands in an erect posture, there are also naked callosities on the buttocks The head is well formed, while the lower jaw is remarkable for the great development of the chin The canine teeth are long The gibbons are inhabitants of forests, their long arms enabling them to swing themselves from bough to bough, which they do to wonderful distances and with extreme agility They cannot move with ease or great rapidity on the ground, yet when they make the attempt they walk more uprightly than any other ape, stretching out their arms on each side, or even more frequently overhead, to balance themselves, with the hands hanging from the wrist They never creep on all fours, and they sleep at night curled up in a ball In captivity they display gentleness and a high degree of teachability and learn to eat all sorts of cooked food, though their natural diet consists mainly of fruit and birds They have various loud cries, expressive of different emotions Their rollicking morning chorus, a long-drawn-out ascending series of wa-hoos, is one of the most startling sounds of the Oriental jungle



DENTITION OF GIBBON
Teeth of upper and lower jaws, left side, *i*, incisors, *c*, canines, *p*, premolars, *m*, molars

There are two genera, *Hylobates,* with about a dozen species, and *Siamanga* or, as it is now called, *Symphalangus,* containing only one, the siamang (q v), which differs from the type in having the first and second digits of the hind foot united as far as the second joint None of the gibbons is of large size The common white-handed or lar gibbon (*Hylobates lar*), black, with a border of gray hair around the face, is found in some parts of India and in more eastern regions The active, or long-armed gibbon (*Hylobates agilis*), found in Sumatra, is particularly remarkable for the power which it displays of flinging itself from one tree to another, clearing at once, it is said, a distance of 40 feet. The wow-wow (*Hylobates leuciscus*) is a gibbon found in Java The hoolock, or wa-wa (*Hylobates hoolock*), is a native of the northeastern part of India and the neighboring parts of Assam The fossil genus *Pithecanthropus* (q v) had much resemblance to gibbons

Consult Hartmann, *Anthropoid Apes* (New York, 1886); Haeckel, *Aus Insulinde* (Bonn, 1901), Elliot, *A Review of the Primates* (New York, 1913) See APE, HOOLOCK, SIAMANG; and Plate of ANTHROPOID APES.

GIB'BON, EDWARD (1737–94) The historian of the Roman Empire, eldest son of Edward Gibbon and Judith Porten He was born at Putney on the Thames, April 27 (O S), 1737 Of his five brothers and one sister none survived infancy The story of his life Gibbon told in his autobiography, published after his death under the title *Memoirs of my Life and Writings* (1796) Like most thinkers, his actions are inseparable from his thoughts and the growth of his mind He spent a sickly childhood in occasional lessons and desultory reading and discussion with his mother's sister, a woman of strong understanding and warm heart, whom he calls "the mother of my mind," and to whose kindness he ascribes not only the bringing out of his intellectual faculties, but the preservation of his life, in these critical early years Though his education was interrupted by illness, he read enormously From various tutors and schools he passed to Magdalen College, Oxford (1752) Here he spent 14 idle months, the chief result of which was that in his incursions into controversial theology he became a convert to the Catholic church and found himself shut out from Oxford His father then placed him under the care of David Mallet, poet and deist, by whose philosophy Gibbon was "rather scandalized than reclaimed" He was then sent to Lausanne, in Switzerland, to board in the house of M Pavilliard, a Calvinist minister, who judiciously suggested books and arguments to the young Gibbon and had the satisfaction of seeing him reconverted to Protestantism in the course of 18 months (1754) Subsequently his mature meditations led him away from all religions With M Pavilliard, whom he greatly respected, he lived for nearly five years. It was here that he began and carried out those private studies which, aided by his enormous memory, made him a master of erudition without a superior and with hardly an equal Here, also, he fell in love with Susanne Curchod, the beautiful and accomplished daughter of a humble minister at Crassy, who afterward became Madame Necker, the mother of Madame de Stael Gibbon's father disapproved of this "strange alliance," and Gibbon yielded to his fate.

Returning to England in 1758, he continued his studies with some interruptions At the request of his father he finished a little work in French, begun at Lausanne, and published it under the title *Essai sur l'étude de la littérature* (1761, Eng version, 1764) In 1759 he became a captain in the Hampshire militia and afterward major and colonel The militia being disbanded, he revisited the Continent, crossing the Alps and going on to Rome, where first came to him the thought of his great work His plan, originally circumscribed to the decay of the city, grew, by years of reading and reflection and delay, to embrace the Empire On the death of his father (1770) Gibbon came into possession of a comfortable fortune, settled in London (1772), and at once began writing the *Decline and Fall of the Roman Empire* In 1774 he joined the famous Literary Club of Dr Johnson and entered Parliament, where he sat "a mute" for eight years. In 1776 the first volume of the *History* was published, and its success was immediate Indeed, the reputation of the author was established before the religious world had time to consider and attack the famous fifteenth and sixteenth chapters, in which, while not denying the "convincing evidence of the doctrine itself" and "the ruling providence of its great Author," Gibbon proceeds to account for the rapid growth of the early Christian Church by "secondary" or human causes He proceeded with the history, publishing two more volumes in 1781 Two years later he returned to Lausanne, where the great work was completed The last three volumes were published in 1788 In 1793 he returned to England to visit his friend Lord Sheffield, whose wife had just died While in London, Gibbon died, Jan 16, 1794, and was buried among the Sheffields in the church at Fletching in Sussex Under the direction of the Royal Historical Society the centenary of his death was commemorated in London, November, 1894

It is not easy to characterize, in a few or in many phrases, a man of so gigantic and cultivated an intellect The *Decline and Fall* is one of the greatest achievements of human thought and erudition It is virtually a history of the civilized world for 13 centuries, during which paganism was breaking down and Christianity was taking its place The new facts which have come to light since Gibbon's time have shown that he was mistaken on many points, but the truth of his picture in the main has never been successfully impeached The work also possesses style No one to-day would imitate, if he could, the balanced structure of Gibbon's sentences But in Gibbon, as in the Elizabethan writers, the charm lies precisely in this stately march of phrase and sentence Byron rightly called Gibbon "the lord of irony" Of this characteristic of his genius, which gives piquancy to his style, the historian himself was aware, and he claimed to have learned it from Pascal, whose *Provincial Letters* he read almost every year After all, Gibbon is at his best where he is most himself, as in the dignity and measured melancholy of his autobiography

Lord Sheffield published Gibbon's *Miscellaneous Works* (2 vols, 1796, 5 vols, 1814). The autobiography contained therein was pieced together from six different manuscripts, with omissions and some additions These six manuscripts have been published by a grandson of the elder Lord Sheffield (London, 1896) Excellent editions of the *Memoirs* have also been edited by O F Emerson (Boston, 1898), by Hill (London, 1900), and by H Morley (New York, 1914). All editions of the *Decline and Fall* have been superseded by that of Bury (7 vols, ib, 1896–1900, new ed, 1909–12) Consult also *The Letters of Gibbon*, ed by Prothero (ib, 1896), and J. A C Morrison, *Gibbon* ("English Men of Letters," New York, 1901)

GIBBON, JOHN (1827–96) An American soldier He was born in Holmesburg, Pa , graduated at West Point in 1847, served in the Mexican War, at the city of Mexico and Toluca, in 1847–48, and was assistant instructor of artillery at West Point in 1854–57, and quartermaster there in 1856–59 During the Civil War he was chief of artillery in General McDowell's division from October, 1861, to May, 1862, was promoted from the rank of captain in the regular army to that of brigadier general of volunteers on May 2, 1862, participated in the second battle of Bull Run and in the battles of South Mountain and Antietam, commanded a division in the Army of the Potomac during the Rappahannock campaign, from November, 1862, to June, 1863, being wounded at Freder-

icksburg on Dec 13, 1862, commanded the Second Army Corps in the battle of Gettysburg, where he was seriously wounded, and then was commander of the Twenty-fourth Corps, in the final campaign of General Grant On June 7, 1864, he became major general of volunteers, and on March 13, 1865, was brevetted brigadier general and major general in the regular army Mustered out of the volunteer service in January, 1866, he reentered the regular army as colonel in July, commanded several Western posts, led the Yellowstone expedition against Sitting Bull in 1876, was wounded in the engagement of Big Hole Pass, Mont, with the Nez Percés on Aug 9, 1877, and commanded successively several departments in the West In 1885 he became brigadier general and put down riots in Washington Territory against the Chinese He was retired in 1891 Gibbon published *The Artillerist's Manual* (1860, 2d ed, 1863)

GIBBONS, gib'ünz, ABIGAIL (HOPPER) (1801–93) An American philanthropist, daughter of Isaac T Hopper (q v) She was born in Philadelphia, taught school there and in New York, and in 1833 married James Sloan Gibbons (q v) She greatly assisted her father in the formation of the Women's Prison Association and of the Isaac T Hopper Home for discharged prisoners During the Civil War she rendered valuable service in the Federal camps and hospitals On account of her prominence as an Abolitionist her home in New York was sacked in the riots of July, 1863 She helped found in New York an infant asylum (1871) and a diet kitchen (1873) Consult her *Life* by her daughter, S H Emerson (New York, 1897)

GIBBONS, ALFRED ST HILL (1858–). A British explorer, born in Lancaster In 1895–96 he made extensive explorations on the upper basin of the Zambezi River In 1898 he ascended the Zambezi from the mouth to Lialui in Barotseland, explored the basins of the Okavango (Kubango) and the Chobe, and, returning to Lialui in August, 1899, set out northward across the head streams of the Zambezi and by way of Lakes Mweru, Tanganyika, Rion, and Albert Edward Nyanza to Lado on the Nile, which he reached in May, 1900 He wrote *Exploration and Hunting in Central Africa* (1898), *The Nile and Zambesi System as Waterways* (1901), *Africa from South to North through Marotseland* (1904)

GIBBONS, CHARLES (1814–85) An American lawyer, born in Wilmington, Del He was admitted to the bar in 1838 and for several years was a member of the State Senate, of which he served as President in 1847 He was a founder of the Union League, whose constitution he formulated, was chairman of the first Republican State Committee, and during the Civil War represented the United States government on a special commission for the argument of prize cases in the Federal courts of Philadelphia

GIBBONS, SIR GEORGE CHRISTIE (1848–) A Canadian lawyer and administrator He was born at St Catherines, Lincoln Co, Ontario, and was educated at Upper Canada College, Toronto He studied law and in 1869 was called to the Ontario bar, of which he became a leader He was a Liberal in politics In 1905 he was appointed chairman of the Canadian section of the International Waterways Commission, which office he filled until November, 1911 He was largely instrumental in effecting the negotiation of the International Waterways Treaty with the United States in 1909

GIBBONS, GRINLING (1648–1721) An English sculptor and wood carver, of Dutch origin He was probably born at Rotterdam and studied under unknown masters He attracted the attention of Evelyn (q v), the diarist, who introduced him to Charles II He was master carver in wood to the crown from Charles II to George I His first important group in wood was a "Crucifixion," after Tintoretto's famous picture, which was followed by his "Stoning of St Stephen," for the King, now at Wyvenhoe Park, Essex Another large carving of his is in the Ducal Palace at Modena Gibbons was much employed by Sir Christopher Wren (q v) in his churches, and in particular carved the choir stalls of St Paul's Cathedral and the woodwork of the library of Trinity College, Cambridge He executed many carvings for the King in the palaces of Windsor, Whitehall, and Kensington, and particularly important are the carvings at Chatsworth, made for the Duke of Devonshire, at Petworth, and at Belton House The wooden throne at Canterbury Cathedral, executed with great delicacy and skill, is also by his hand He also essayed sculpture in bronze and marble, but not with the same success, as is shown by his marble statues of Charles II in the Royal Exchange and Chelsea Hospital and by the bronze statue of James II at Whitehall His work is particularly famous for the splendid groups and festoons of flowers, fruit, game, etc, in life size, and very true to nature

GIBBONS, JAMES, CARDINAL (1834–1921) An American Roman Catholic prelate He was born in Baltimore, July 23, 1834, and received his early education in Ireland, the former home of his family, to which he was taken in infancy. Returning to Maryland at the age of 17, he pursued his studies for the priesthood at St Charles's College and St Mary's Seminary He was ordained in 1861 and after a few months of service at St Patrick's, Baltimore, was placed in charge of St Bridget's Church, Canton, just outside the city Archbishop Spaulding soon discerned his gifts and brought him to the cathedral as secretary and soon made him chancellor In 1868 he was made Vicar Apostolic of North Carolina, and to fulfill the duties of the office he was consecrated Bishop His successful administration of this difficult work earned him promotion in 1872 to the see of Richmond, Va, and his five years there were also marked by notable development of the church's activity in many directions Appointed in 1877 Coadjutor with right of succession to Archbishop Bailey of Baltimore, then in failing health, later in the same year he succeeded to the see, gaining with it the title "Primate of the United States" In right of this office he presided over the important deliberations of the Third Plenary Council of Baltimore in 1884, whose successful issue was largely due to him In recognition of all these services, as well as of the growing importance of the American branch of the church, he was created Cardinal by Leo XIII in 1886, but his elevation made no difference in the simple, unostentatious kindliness which had long endeared him to all who knew him, without as well as within his own communion Bishop Curtis, formerly of Wilmington, Del, was appointed to assist him in 1896 His best-known

work is *The Faith of our Fathers* (1871), others are *Our Christian Heritage* (1889) and *The Ambassador of Christ* (1896)

GIBBONS, JAMES SLOAN (1810–92) An American author and philanthropist, born in Wilmington, Del From 1835 he was active in New York City as a banker and a writer on financial subjects A friend of Wendell Phillips, William Lloyd Garrison, and other notable Abolitionists, he rendered much aid to their cause, being a member of the executive committee of the American Anti-Slavery Society and a supporter of the *Emancipator* and *Standard* He opposed Garrison's radical disunion policy In 1863 his house in New York City was sacked on account of its illumination in honor of the Emancipation Proclamation In 1862 he published in the New York *Evening Post* his famous war song, "We are coming, Father Abraham, three hundred thousand strong" He began the movement towards the preservation of forests in the United States He wrote *The Banks of New York* (1858), *The Public Debt of the United States* (1867), and other works, some under the pen name Robert Morris His wife, Abigail, was a daughter of Isaac T Hopper

GIBBONS, ORLANDO (1583–1625) A celebrated English organist and composer In his boyhood he served as a chorister at King's College, Cambridge, in 1604 was appointed organist of the Chapel Royal and in 1623 of Westminster Abbey He is one of the most important composers in the history and evolution of English music, his services and anthems still being regularly sung in all the cathedrals and important churches of Great Britain His compositions were the earliest engraved musical works in England His madrigals, "Dainty Sweet Bird," and "The Silver Swan," are among the best of their kind and have always been popular, while the anthems, "Hosannah to the Son of David," "Almighty and Everlasting God," and "O Clap Your Hands Together," are reckoned masterpieces of scientific writing in the fugue form, combined with exquisite melody He died of smallpox, caught while taking part in the marriage services of Charles I, for which ceremony he had composed the music His two brothers, EDWARD (c 1570–c 1650), organist of Bristol Cathedral, and ELLIS (?–c 1650), organist of Salisbury Cathedral, were also musicians of wide repute, and his son, CHRISTOPHER GIBBONS (1615–76), succeeded in 1660 to both of his father's positions at the Chapel Royal and Westminster Abbey

GIBBS, gĭbz, ALFRED (1823–68). An American soldier, born in Sunswick, near Astoria, L I, a brother of Oliver Wolcott Gibbs He graduated at West Point in 1846, served as second lieutenant in the Southern campaign under Scott during the Mexican War, and was brevetted first lieutenant and captain From 1848 to 1856 he was aid-de-camp to Gen Persifor F. Smith in Mexico, Texas, New Mexico, and California, was wounded in an engagement with the Apache Indians at Cooke's Spring, N M, on March 8, 1857, and from 1858 to 1860 was employed in the recruiting service On May 13, 1861, he became captain He was captured by a Texan force in July, 1861, was paroled, and was not exchanged until August, 1862 He took an active part in various cavalry operations in Virginia, particularly under Sheridan in the Shenandoah valley, was promoted to be brigadier general of volunteers in October, 1864, and commanded a cavalry brigade in Grant's final campaign against Lee On March 13, 1865, he was brevetted colonel and brigadier general and major general in the regular army He was mustered out of the volunteer service on Feb 1, 1866, and until his death at Fort Leavenworth, Kans, was on frontier duty at various Western posts as major of the Seventh Cavalry

GIBBS, JAMES (1682–1754) A British architect, born at Aberdeen After an apprenticeship in Holland he studied in Rome under Carlo Fontana In 1709 he returned to London, where he won the friendship of Sir Christopher Wren, by whom he was powerfully influenced His most noted works were the churches in London of St Mary-le-Strand (1714–17) and St Martin's-in-the-Fields (1722)—the latter especially a prototype of many American Colonial churches, and at Oxford the famous circular Radcliffe Library (1737), but he also designed many other edifices He was the author of *A Book of Architecture* (1728), *The Rules for Drawing the Several Parts of Architecture* (1732), and *Bibliotheca Radcliffiana* (1747)

GIBBS, JOSIAH WILLARD (1790–1861) An American philologist He was born at Salem, Mass, graduated at Yale in 1809, and was a tutor there from 1811 to 1815 In 1824 he became professor of sacred literature, an appointment which he held until his death Among his publications are a translation of Storr's *Essay on the Historical Sense of the New Testament* (1817), a translation of Gesenius' *Hebrew Lexicon of the Old Testament* (1824), and *Philological Studies* (1857) He was a contributor to Prof William C Fowler's *English Language in its Elements and its Forms* (1850) and to Webster's *Unabridged Dictionary*

GIBBS, JOSIAH WILLARD (1839–1903) An American physicist, born at New Haven, Conn He graduated at Yale in 1858 (Ph D 1863), was a tutor there for three years, and afterward studied in Paris, Berlin, and Heidelberg In 1871 he was appointed professor of mathematical physics at Yale He was elected a member of the National Academy of Sciences and of the Royal Society of London, was a vice president (1886) of the American Association for the Advancement of Science, and was awarded the Rumford medal of the American Academy of Arts and Sciences for researches in graphical and analytical methods in thermodynamics His writings include numerous papers on mathematical physics, and *Elementary Principles in Statistical Mechanics* (1902)

GIBBS, (OLIVER) WOLCOTT (1822–1908). A distinguished American chemist He was born in New York City, graduated at Columbia College in 1841 and at the College of Physicians and Surgeons in 1847, and subsequently studied medicine and the physical sciences in Germany From 1863 to 1887 he was Rumford professor at Harvard and lectured on science as applied to the useful arts During the Civil War he was an active member of the Sanitary Commission and in 1873 went as one of the commissioners to the Vienna Exposition He is the author of many papers on chemical science in the *American Journal of Science* He was president of the National Academy of Sciences in 1897 Dr. Gibbs carried out many original investigations in physics and chemistry His researches on vapor densities, on the platinum metals, and on the ammonia-cobalt bases were

important The Wolcott Gibbs laboratory of physicochemical research at Harvard University is named after him

GIBBS'ITE An aluminium hydrate, crystallizing in the monoclinic system, but usually found in mammillary crusts and stalactitic shapes It is commonly white, grayish, or yellowish Gibbsite is found in small deposits, often associated with limonite, also with the bauxite of Georgia and Alabama Gibbsite is an unimportant ore of aluminium

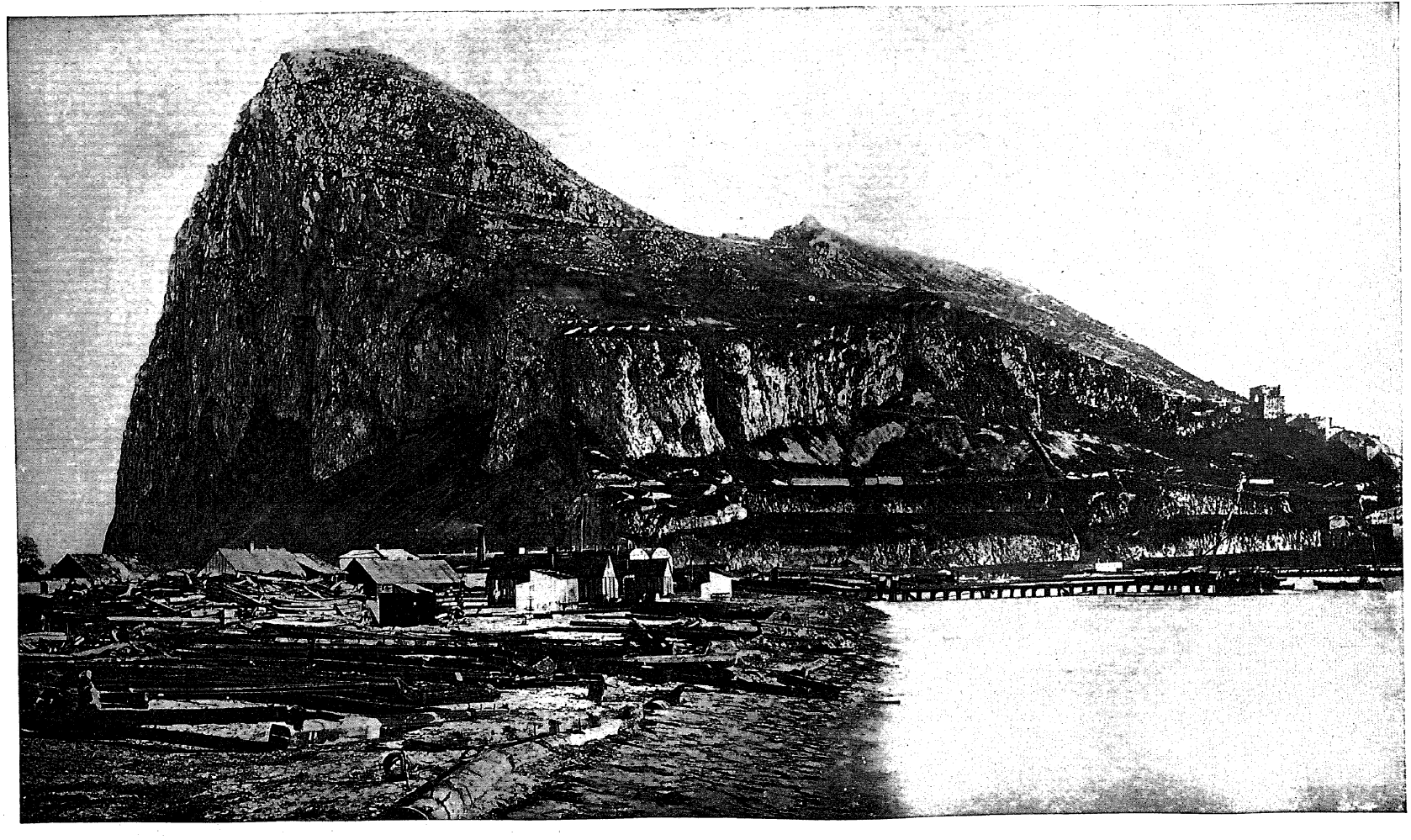
GIBEAH, gĭb'ē-a (Heb, *Gib'ah*, hill) The name of several places in ancient Palestine, the chief of which was Gibeah of Benjamin, or Gibeah of Saul It was north of Jerusalem and south of Ramah and was the scene of the story of the Levite and his concubine (Judg xix–xxi) It was the home of Saul and probably his birthplace (1 Sam x 26) Two sons and five grandsons of Saul are said to have been executed here in revenge for a slaughter of the Gibeonites by Saul Gibeah of Benjamin has been identified with the modern village of Tell el-Ful, about 4 miles north of Jerusalem

GIBEL, gĭb'el (Ger, sort of chub, Fr *gibel;* possibly connected with Ger *Giebel*, gable, OHG *gebal*, head, *gibulla*, skull, Gk κεφαλή, *kephalē*, head), or PRUSSIAN CARP. A small carp (*Cyprinus gibelio*) without barbels, common in some parts of continental Europe and in England It differs from the crucian in having a forked tail and is an excellent table fish See CARP

GIBEON, gĭb'ē-on (Heb *Gib'on*, hilly). An ancient city of Palestine, northwest of Jerusalem, at the time of the conquest by the Israelites inhabited by the Hivites (Josh ix. 3, 7). By means of a stratagem the Gibeonites secured a promise of friendship from Joshua The deceit was afterward discovered, but the letter of the promise was kept, the Gibeonites being condemned to be "hewers of wood and drawers of water for the congregation," and when the five kings of the Amorites attacked Gibeon, Joshua went to its assistance (Josh ix. 3–x 7) It was during the battle fought on this occasion that "the sun stood still and the moon stayed, until the people had avenged themselves upon their enemies," according to the testimony of a song preserved in the collection called *Sefer ha yashar*, or 'Book of the Brave,' quoted and approved by the historian in Josh x. 8–14. Saul almost exterminated the Gibeonites (2 Sam xxi 1–5) Gibeon was the scene of a battle between David's forces and those of Ishbaal (2 Sam. ii 12–32), and at "the great stone which is in Gibeon" David's general, Joab, treacherously slew the other general, Amasa (2 Sam. xx. 4–10). The city had its chief importance as the seat of a *bamah* (high place), called in 1 Kings iii 4 "the great high place" At the beginning of his reign Solomon sacrificed there 1000 burnt offerings, and Yahwe appeared to him in a dream by night (1 Kings iii 4–15) Gibeon is identified with the modern village of el-Jib, about 5 miles northwest of Jerusalem

GIBRALTAR, jĭb-ral'tĕr, *Sp. pron* hē-bral-tar'. A town and fortress, constituting a British colony, on the rocky promontory of Gibraltar, forming the eastern horn of the Bay of Algeciras, or Gibraltar, on the south coast of Andalusia, Spain, at the eastern end of the Strait of Gibraltar, at the entrance to the Mediterranean (Map Spain, C 5). It was captured by the British forces under Sir George Rooke, July 24, 1704, and was ceded to Great Britain by the Treaty of Utrecht in 1713 It stands opposite the Spanish town of Algeciras, 6 miles distant on the west side of the bay, with which it has steam-ferry communication several times daily Owing to its important strategical position, it is called the "Key of the Mediterranean" The sandy isthmus connecting the promontory with the mainland is neutral territory, it lies so low that from the sea Gibraltar has the appearance of an islet The Spanish town of La Línea de la Concepción, practically a suburb of Gibraltar, on the mainland, fronts the isthmus and the neutral ground, the Spanish boundary being marked by a double line of sentry boxes The population of La Línea (commune) in 1910 was 30,005 The promontory, or "Rock of Gibraltar," is composed of gray primary marble Its length is 2¾ miles, its greatest breadth about ¾ of a mile, and its greatest elevation 1439 feet The area of Gibraltar is 1⅞ square miles Although it has a barren and uninviting aspect, aloes, cacti, palmitas, capers, and asparagus grow in the crevices, and there are grassy wooded glens in certain parts, where partridges, pigeons, woodcocks, and fawn-colored Barbary apes are to be found There are several natural caves in the rock, of which St Michael's, with an entrance 1100 feet above the sea, is the largest The north, east, and south sides of the promontory are so steep and precipitous as to be almost inaccessible, the north and northwest sides are honeycombed by fortified artificial galleries The town and harbor on the west are protected by batteries and forts rising from the base to the summit of the rock Modern guns of the most formidable pattern have replaced the old armaments The harbor is formed by three separate moles, known as the North, the South, and the Detached moles The North Mole runs westward about 2900 feet and then southward, having a total length of over a mile The South Mole extends from the shore northwesterly 3660 feet The Detached Mole, 2717 feet long, is situated between the other moles, forming a breakwater and leaving at either end a passage for vessels The water area of the harbor is 440 acres There are three large graving docks for naval purposes and a small dock available to merchant vessels of light draft

The town, divided by the Alameda park into two parts, although irregularly laid out, contains several fine public buildings The houses are built in terraces and for the most part are of Spanish architecture There are an Anglican cathedral, four Roman Catholic churches, and hospitals The water supply depends on the rainfall, which is stored in a system of huge tanks The climate is the warmest in Europe, but is healthful, the former unsanitary conditions having been removed by modern methods The colony is self-supporting, the revenue in 1912 being £105,738 and the expenditure £81,613, but the garrison is maintained by the British government Gibraltar is a free port except as to alcoholic liquors and tobacco It is also an important coaling station The tonnage of vessels entered and cleared was over 11,700,000 in 1911, of which over 7,100,000 British The legal currency is British, but Spanish money is also in circulation There is no legislative body or executive council The Governor, who is also the general commanding the garrison, exercises



ROCK OF GIBRALTAR

both executive and legislative functions The civil population, according to the census of 1891, was 19,100, 1901, 20,355, 1911, 19,586 (9228 male, 10,358 female) In 1911 the military population was 5340, naval, 441, total population, 25,367 Estimate for 1913, 23,572 The inhabitants are largely of Spanish and Italian descent, but include Britons, Jews, and Moors Among the civil population the birth rate is about 20 and the death rate about 15

Gibraltar (the Phœnician Alube and Greek Calpe) and Abyla (the Sierra Bullones near Ceuta, Morocco) are the classical "Pillars of Hercules," which were crowned by silver columns erected by the Phœnician mariners to mark the limits of navigation After 711 the rock was named Jebel-al-Tarik (Hill of Tarik, whence its modern name), after the Arab chief Tarik ibn Ziad, who built a fortress on the promontory, part of which still exists In 1309 Gibraltar was taken by the Castilians, but was regained by the Moors in 1333 and held until 1462, when it finally passed from their possession In 1502 it was annexed to the Spanish crown After the sacking of Gibraltar by Barbarossa, the Algerine, in 1540, extensive works were built by command of Charles V In 1704 it was captured by a combined Dutch and English force under Sir George Rooke and the Prince of Hesse-Darmstadt, fighting for the Archduke Charles of Austria, but it was unscrupulously taken possession of for the crown of England by the British admiral The Treaty of Utrecht (1713) ceded the fortress to Great Britain The most important event in its subsequent history is the famous siege of three years, seven months, and twelve days, extending from 1779 to 1783, which bristled with exciting incidents Communications with Spain were closed on June 21, 1779, and a strict blockade was established by the Spanish fleet, the strength of the besieged force at this period was 5382 men, under General Eliott, the Governor Twice the garrison was almost reduced to starvation, being temporarily relieved in the face of great opposition—on the first occasion by Admiral Rodney, who added 1000 to the defenders, and on the second occasion by Admiral Darby In July, 1782, the Duc de Crillon took command of the combined naval and land forces of France and Spain employed in the siege and made preparations for a supreme effort Additional batteries were constructed on the land side, and 10 enormous and presumedly invincible floating batteries were constructed by the Chevalier d'Arçon Covered boats to disembark 40,000 troops were also prepared The formidable attack commenced on September 8, and continued until the 13th, when, by the expedient of red-hot balls, the British destroyed the floating batteries and repulsed their enemies, of whom over 2000 were killed The British casualties were 16 killed and 68 wounded The signing of the preliminaries of peace put an end to the siege in February, 1783 In 1830 a Charter of Justice was given to the people and the inhabitants were granted civil liberty. Consult Drinkwater, *History of the Siege of Gibraltar* (London, 1785, new ed, 1844), Mann, *History of Gibraltar* (ib, 1870), Field, *Gibraltar* (New York, 1889), Boyle, *Gibraltar* (British Empire, Ser v, London, 1902); Spilsbury, *Journal of the Siege of Gibraltar* (ib, 1908), Lang, *Gibraltar and the West Indies* (New York, 1909).

GIBRALTAR, STRAIT OF (Lat. *Fretum Herculeum*) A narrow passage connecting the Atlantic Ocean with the Mediterranean Sea and separating Spain from Morocco (Map Europe, C 5) Its length is about 40 miles, and its width varies from about 9 miles at the west entrance to about 13 miles at the east entrance A channel, 5 miles wide, through the centre of the Strait has a depth of 1000 feet A continual central current enters from the Atlantic, and tidal currents ebb and flow along the European and African shores It has been demonstrated that there exists a west-flowing undercurrent which carries off the surplus waters of the Mediterranean

GIBRALTAR OF AMERICA A frequent name for Quebec, because of its position and strong fortifications

GIBSON, gib'son, CHARLES DANA (1867–) An American illustrator He was born at Roxbury, Mass, Sept 14, 1867 The first eight years of his life were spent in Boston Later his home was in Flushing, L I He studied at the Art Students' League, New York, and under Saint-Gaudens In 1886 he made his début as an artist for the periodicals In 1889 he went to Paris and was enrolled at Julian's studio Returning to New York, he was active as an illustrator for *Life*, the *Century*, *Scribner's*, *Harper's*, and other magazines The publication of his drawings in album form greatly increased his popularity In 1893–94 he was again in Paris, in 1895–96 in London, in 1898 in Munich Gibson is one of the greatest living masters of black and white His method is original and has been frequently imitated, but never equaled It combines daintiness with boldness and is characterized by free insistence on live and brilliant high lights He has a strong feeling for the beautiful, the dramatic, and the humorous His types, while not numerous, are well characterized He excels in depicting well-bred American society, and is the creator of the fascinating, haughty, egotistic "American Girl," so popular in modern illustrations His subjects are taken from the boulevards, byways, theatres, clubs, law courts, music halls, parks, and crowds in stations His published works include *London, as Seen by C D Gibson* (1895–96), *Pictures of People* (1896), *People of Dickens* (1897), *Sketches and Cartoons* (1898), *Sketches in Egypt* (1899), *The Education of Mr Pip* (1899), *Americans* (1900), *A Widow and her Friends* (1901), *The Social Ladder* (1902), *Our Neighbors* (1905) Among the books illustrated by him are Anthony Hope's *Prisoners of Zenda* and *Rupert of Henzau*, R H Davis's *Soldiers of Fortune*, and Robert Grant's *Art of Living* From 1900 to 1905 he devoted himself almost wholly to cartoons for *Life* and *Collier's Weekly* In the latter year he gave up illustrating and went to Europe to study color painting, in which he achieved real success, but he has since returned to New York and resumed illustration

GIBSON, EDMUND (1669–1748) Bishop of London and an authority upon canon law He was born at Bampton, entered Queen's College, Oxford, in 1686, and in 1692 published an edition of the *Saxon Chronicle*, with a Latin translation, indexes, and notes This was followed in 1693 by an annotated edition of the *De Institutione Oratoria* of Quintilian and in 1695 by a translation of Camden's *Britannia*, "with additions and improvements," in the preparation of which he had the assistance of several other

scholars The year preceding he had taken holy orders and became chaplain and librarian to Thomas Tenison, Archbishop of Canterbury In 1703 he became rector of Lambeth and in 1710 Archdeacon of Surrey In the discussions which arose in the reigns of William and Anne relative to the rights and privileges of the Convocation, Gibson took a very active part and in a series of pamphlets warmly advocated the right of the Archbishop to continue or prorogue that assembly The controversy suggested to him the idea of those researches which resulted in the *Codex Juris Ecclesiæ Anglicanæ* In 1716 Gibson was consecrated Bishop of Lincoln, whence he was, in 1723, translated to London, where for 25 years he exercised an immense influence, being the authority chiefly consulted by the court on all ecclesiastical affairs Among the literary efforts of his later years the principal were a series of *Pastoral Letters* and the *Preservative against Popery* (1738), a compilation of numerous controversal writings of eminent Church of England divines, dating chiefly from the period of James II He died at Bath, Sept 6, 1748

GIBSON, JOHN (1790–1866) An English sculptor He was born at Gyffin, near Conway, North Wales, and at an early age was apprenticed to a cabinetmaker in Liverpool When 16 years old he was employed in the marble works of Francis, at Liverpool, where his talents gained him the patronage of William Roscoe, who not only became his friend, but also secured him pecuniary aid In 1817 he made his way to London, and in the same year he went to Rome, bearing a letter of introduction from Lord Brougham to Canova He entered the atelier of Canova, also studying under Thorvaldsen, and remained in Rome 27 years, executing in that city most of his important works

In 1819 he executed his first commission, a group of "Mars and Cupid," for the Duke of Devonshire, now at Chatsworth Under the influence of Canova and Thorvaldsen his work became thoroughly classic, and he excelled in portraying ideal Greek subjects of youthful beauty Among the most famous of these are the "Sleeping Shepherd Boy," his first work at Rome, and "Hylos Surprised by Nymphs" (1826), the latter in the National Gallery, London, and especially his statue of "Venus with the Turtle," one of his latest works, which he himself considered his best. In this statue and in others he made use of the polychromy of the Greeks, as he conceived it He was so thoroughly wedded to Greek art that when commissioned to make a portrait statue of Queen Victoria he would do it in no other wise than represent her in classical draperies and with sandals In the palace of Westminster he carved the group in which the Queen is represented leading the allegorical figures of "Clemency" and "Justice" The only religious subject he portrayed was "Christ Blessing the Little Children" His best work in the round was the "Hunter and Dog" His classical tendencies interfered with his success in portrait statues Among the best known of these are the colossal statue of Huskisson (1844), in Liverpool, and two other statues of the same statesman, Sir Robert Peel, in Westminster Abbey, and George Stephenson, in Liverpool Gibson was a man of kindly life and character and notoriously absent-minded. His only pupil and most intimate friend was Harriet Hosmer, the American sculptress He died in Rome, Jan 27, 1866 Consult his *Life* by Lady Eastlake (London, 1870), which also contains his autobiography, and Carr, *Essays on Art* (ib, 1879)

GIBSON, JOHN MONRO (1838–1921) A British Presbyterian clergyman, born at Whithorn, Scotland He went to Canada in 1855, graduated in 1862 at Toronto University, and in 1864 at Knox College (theological), Toronto, and in 1864–74 was pastor of the Erskine Church, Montreal, and in 1868–74 lecturer in Hebrew and Greek exegesis at Montreal Theological College He was pastor of the Second Presbyterian Church, Chicago, in 1874–80, and then of the St John's Wood Presbyterian Church, London, England In 1891 he was elected moderator of the Presbyterian church in England, and in 1897 president of the national council of Free churches He wrote *The Ages before Moses* (1879), *The Foundations* (1880), *The Gospel of Matthew* (1890) in the "Expositor's Bible", *The Unity and Symmetry of the Bible* (1896), *From Fact to Faith* (1898), *The Glory of Life* (1900), *Apocalyptic Sketches* (1901), *Protestant Principles* (1901), *Devotional Study of Holy Scripture* (1904), *The Inspiration and Authority of Holy Scripture* (1908)

GIBSON, SIR JOHN MORISON (1842–) A Canadian administrator He was born near Toronto and was educated at Toronto University, where he graduated with the highest honors in 1863 and afterward took a law course He practiced his profession in Hamilton, where he became one of the leaders of the provincial bar Entering politics in 1879, he was a Liberal member of the Ontario Legislature almost continuously from that year until 1905 In 1889–96 he was Provincial Secretary in the administration of Sir Oliver Mowat (q v), in 1896–99, Commissioner of Crownlands in the administration of Sir Arthur Sturgis Hardy (q v), and in 1899–1905, Attorney-General in the administration of Hon George William Ross (q v) He early manifested an active interest in military matters, served in the militia during the Fenian raid of 1866, rose to the rank of lieutenant colonel in 1895, and was brigade commander in 1905–09 While he was a member of the Legislature he procured the passage of laws restricting the liquor traffic, reorganizing the Ontario insurance system, conserving fish and game resources, and for the protection of neglected and dependent children In 1908–14 he was Lieutenant Governor of Ontario In 1912 he was knighted.

GIBSON, MARGARET DUNLOP (*née* SMITH) (?–1920) A British Orientalist, born in Ayrshire With her sister, Mrs Agnes Smith Lewis, she visited Palestine several times (especially after 1886, when her husband, James Young Gibson, translator of Cervantes, died) In 1892 they discovered and photographed the Syriac palimpsest of the Gospels in the Sinai The two sisters gave the site in Cambridge for Westminster Theological College (Presbyterian), opened in 1899 Mrs Gibson received honorary degrees from Heidelberg, St Andrew's, and Dublin universities She wrote *How the Codex was Found* (1893), *Apocrypha Sinaitica* (1896), *Horæ Semiticæ* (1903 et seq), *The Commentaries of Isho'dad* (1911), Syriac and English *Commentaries on Acts* (1913)

GIBSON, RANDELL LEE (1830–92) An American soldier and legislator He was born at

Spring Hill, Ky, and graduated at Yale (valedictorian) in 1853 and at the law school of the University of Louisiana (now Tulane University) in 1855 Admitted to the bar, he went to Europe and studied at Berlin and at Madrid, where he was attached to the American Legation In 1856 he returned to Louisiana, where he was engaged in sugar planting until the outbreak of the Civil War Enlisting as a private in the Louisiana volunteers, he was rapidly promoted, was appointed colonel of the Thirteenth Louisiana Infantry, and commanded a brigade at Shiloh, where he led four unsuccessful charges on the famous "Hornets' Nest" He fought in the battles of Perryville, Murfreesboro, and Chickamauga, and was promoted brigadier and major general He participated in the battles during Johnston's retreat from Dalton to Atlanta, at the battles of Jonesboro and Nashville, and in the Mobile campaign, where he successfully defended Spanish Fort against General Canby After the war he began the practice of law in New Orleans He was elected to Congress in 1872, but was not seated On his second election, in 1874, however, he was seated and remained in the House of Representatives until 1883, after which, until his death, he was a member of the United States Senate, where, as in the Lower House, he worked for the improvement of the Mississippi River and the establishment of the Mississippi River Commission He was president of the board that administered the fund for Tulane University and a trustee of the Peabody Fund A selection from his speeches in the Senate was published in Washington in 1891

GIBSON, THOMAS MILNER- (1806–84) An English statesman The only son of Major Milner Gibson, he was born at Port of Spain, Trinidad, West Indies, Sept 3, 1806 He was first educated at Dr Cogan's Unitarian School, Walthamstow, where Benjamin Disraeli was his classmate He entered at the Charterhouse School in 1819 and in 1830 received the B A degree at Trinity College, Cambridge. In 1837 he entered Parliament as Conservative member for Ipswich, but became a Liberal and resigned two years later He assumed the surname of Milner-Gibson by royal license in 1839 After unsuccessful attempts to reenter Parliament, he was returned for Manchester in 1841 In 1846 Lord John Russell made him Privy Councilor and Vice President of the Board of Trade As president of the Association for the Repeal of Taxes on Knowledge, his crusade against the excise on paper, the advertisement duty, and the newspaper stamp duty, resulted in the repeal of these taxes in 1861, and Milner-Gibson was the recipient of a public testimonial At the outbreak of the Crimean War he identified himself with the "Peace Party" of Cobden and Bright His views were distasteful to his constituency, and he was unseated in 1857, but the same year was returned for Ashton-under-Lyne, which he represented till 1868, when his defeat at the general election led to his retirement from political life with a pension of £2000. From 1859 to 1866 he was president of the Poor-Law Board, and President of the Board of Trade with cabinet rank He was an enthusiastic yachtsman, senior member of the Royal Yacht Squadron, and also an elder brother of Trinity House He died on board his yacht at Algiers, Feb 25, 1884.

GIBSON, WILLIAM (1788–1868). An American surgeon, born in Baltimore, Md He graduated at Princeton in 1806 and at the University of Edinburgh in 1809 In 1815 he fought with the Allies at Waterloo From 1819 to 1855 he was professor of surgery in the University of Pennsylvania He was the friend of Lord Byron and of many noteworthy English and European surgeons He published *Principles and Practice of Surgery* (2 vols, 1824), once widely used and *Rambles in Europe* (1839) Consult Gross, *Lives of Eminent American Physicians and Surgeons of the Nineteenth Century* (Philadelphia, 1861)

GIBSON, WILLIAM (1849–1914) A Canadian capitalist and legislator He was born at Peterhead, Scotland, and was educated at the Peterhead Academy Coming to Canada in 1870, he engaged in business and became a successful railway contractor, wealthy, and a director in various industrial and financial corporations He handled some of the most important railway contracts in Canada, including the masonry on both sides of the St Clair River Tunnel, the Sarnia portals and their approaches, and the enlargement of the Victoria Jubilee Bridge, Montreal In 1891–1900 he was a Liberal member of the House of Commons and in 1900 was appointed chief Liberal "whip" for that body In 1902 he became a member of the Dominion Senate.

GIBSON, WILLIAM HAMILTON (1850–96) An American illustrator and author, born at Sandy Hook, N J He studied at Washington, Conn, and afterward at the Polytechnic Institute, Brooklyn His career as an artist began with illustrations of botanical drawings for the *American Agriculturist* and *Hearth and Home*, also for *Harper's Magazine* and the *Art Journal* Gibson's drawing are very correct and minute in detail, and in water color he used a few tints exquisitely His subjects include the interpretations of woodland beauties and of flowers and insects His art is pervaded with the accuracy of the lover of scientific fact, and he was a successful lecturer on botany He was author and illustrator of the following publications *Camp Life in the Woods* (1882), *Highways and Byways* (1883), *Happy Hunting Grounds* (1886), *Sharp Eyes* (1892), *Our Edible Toadstools and Mushrooms* (1895), *Eye Spy* (1897) He made the illustrations for E P Roe's *Nature's Serial Story* and was one of the illustrators of *Picturesque America* A memorial exhibit of his works was held at the National Arts Club, New York, in 1900 Consult Adams, *W H. Gibson* (New York, 1901)

GICHTEL, gĭk'tel, JOHANN GEORG (1638–1710) A German mystic He was born in Regensburg and was a lawyer by profession In 1664 he came under mystic influence, experienced visions, and thenceforth devoted himself entirely to a Society for Christian Edification His teachings brought him frequently into conflict with the authorities Banished from his native town, he betook himself to Holland, where the same experience was repeated After 1668 he lived at Amsterdam He founded an order whose members called themselves "Angelic Brethren" because they renounced marriage He made the first collected edition of the writings of Jakob Boehme (Amsterdam, 1682). His own writings appeared in a collected edition at Leyden in 1722, and his biography, in connection with Boehme's, was written by Harless (Leipzig, 1882)

GID, gĭd (from *giddy*), or STURDY A disease

of sheep, caused by the presence of the larva of a tapeworm, *Multiceps multiceps* (*Tænia cœnurus*) in the brain Before the life history of this parasite was discovered the larva was known as *Cœnurus cerebralis*, which sometimes attains the size of a hazelnut It floats in a watery fluid inclosed in a membranous sac Should the larva be eaten by a dog, it develops in the dog's intestines to a vermiform parasite, and produces eggs which, being voided by the dog in the detached segments, may be picked up by the sheep while grazing The hard shell of the egg is digested off, and a minute embryo liberated, which bores its way through the walls of the digestive tract, and finally into a blood vessel and reaches the brain by way of the blood stream Coyotes may also serve the same office as the dog in the life cycle of the worm The afflicted sheep staggers when moved, turns stupidly around almost in one spot, usually towards the side upon which the parasite lies, and loses flesh because these conditions interfere with food prehension The parasite and its sac may generally be safely removed by placing the sheep, with its feet tied, on a table or bench, searching for the softened portion of the skull, which generally overlies the hydatid, laying back a flap of skin, and introducing the trochar and cannula, and, when the sac is deep-seated, cautiously withdrawing it with the help of a small syringe Protected by a leather cap and simple water dressings, the wound speedily heals In preventing the spread of this disease, which is especially common in low, damp pastures, and among sheep from 6 to 20 months old, it is desirable to burn the heads of affected sheep, otherwise they may be eaten by dogs in which the immature tapeworms would develop to the adult egg-laying form Consult M. C Hall, "The Gid Parasite and Allied Species of the Cestode Genus Multiceps," *United States Department of Agriculture, Bureau of Animal Industry, Bulletin 125* (1910), id, "Some Important Facts in the Life History of the Gid Parasite and their Bearing on the Prevention of the Disease," *United States Department of Agriculture, Bureau of Animal Industry, Circular 159* (1910), id, "Methods for the Eradication of Gid," *United States Department of Agriculture, Bureau of Animal Industry, Circular 165* (1910)

GID'DINESS See VERTIGO

GIDDINGS, gid'dingz, FRANKLIN HENRY (1855–) An American sociologist and economist, born at Sherman, Conn He graduated at Union College (1877) and engaged in newspaper work, writing on politics and economics for the Springfield *Republican* and the Springfield *Daily Union* In 1888 he was appointed lecturer in political science at Bryn Mawr, where he was subsequently advanced to the chair of political science, and in 1894 he became professor of sociology at Columbia University From 1892 to 1905 he was a vice president of the American Academy of Political and Social Science His principal works are *The Modern Distributive Process* (in collaboration with J B. Clark, 1888), *The Theory of Sociology* (1894), *Principles of Sociology* (1896), *The Theory of Socialization* (1897), *Elements of Sociology* (1898), *Democracy and Empire* (1900), *Inductive Sociology* (1901), *Descriptive and Historical Sociology* (1906) The working principle by which he seeks to explain the fundamental sociological phenomena is psychical in its nature—"consciousness of kind" in his earlier works, "like response to like stimuli" in the *Inductive Sociology* In this he differs radically from the school of contemporary writers, who seek to explain sociological facts in terms of the environment His later works are characterized by the ingenious application of statistical method to sociological material See SOCIOLOGY

GIDDINGS, JOSHUA REED (1795–1864) An eminent American legislator, prominent as a "Constitutional" Abolitionist in the antislavery struggle He was born at Tioga Point (now Athens), Pa, Oct 6, 1795 His early life was spent in Canandaigua, N Y, until his parents removed to Ashtabula County, Ohio, where he afterward resided He enlisted as a soldier in the War of 1812 and served for a few months in the protection of the Western Reserve against the Indians, then taught school, studied law, and in 1821 began professional practice at Jefferson In 1826 he was sent to the State Legislature and in 1838 to Congress The slavery agitation had already begun, and Giddings became a forceful advocate of the abolition of slavery in the District of Columbia and the national Territories He supported the efforts of John Quincy Adams to maintain the right of petition and in fact seized upon every opportunity to develop a public sentiment hostile to slavery On Feb 9, 1841, he delivered a powerful speech upon the Indian War in Florida, insisting that it was waged in the interest of slavery While the excitement caused by the *Creole case* (q v) was at its height, he introduced in the House of Representatives a series of resolutions declaring that the slaves, having simply asserted their indefeasible right to liberty, were guilty of no crime, and that as soon as they left the jurisdiction of Virginia they became free The resolutions created a tumultuous excitement, and Giddings was censured by vote of the House for presenting them He thereupon resigned his seat, but was reelected by a very large majority He was kept at his post by successive reelections until 1859, thus completing a continuous service of 20 years Until 1848 he was a member of the Whig party, supporting its principal measures, but maintaining his independence in all matters relating to slavery He did much to develop those views with regard to the relation of slavery to the national government which afterward became the basis of the Republican party He took a prominent part in the struggle to prevent the extension of slavery to the territory wrested from Mexico by the War of 1846–47, and in resisting the adoption of the Compromise of 1850, especially the reenactment of the Fugitive Slave Law (q v) He was also conspicuous in the debates which preceded the repeal of the Missouri Compromise in 1854 and in the great struggle by which Kansas was made a free State On May 8, 1856, while addressing the House, he suddenly fell to the floor in a state of unconsciousness He soon revived, but his former strength was never fully restored On Jan 17, 1858, he fell again in the same way and for a time was supposed to be dead He again rallied, however, but was compelled for a time to leave his post In 1861 he was appointed Consul General for the British North American Provinces, with headquarters in Montreal In 1843 he wrote a series of political essays signed "Pacificus," which attracted wide attention A volume of his speeches was pub-

lished in 1853 He also wrote *The Exiles of Florida* (1858) and *The History of the Rebellion Its Authors and Causes* (1864) Consult Buel, *Joshua R Giddings* (Cleveland, 1882), and, more particularly, Julian, *Life of Joshua R Giddings* (Chicago, 1892)

GIDE, zhēd, CHARLES (1847–) A French political economist, born at Uzès (Gard) From 1874 to 1880 he was professor of jurisprudence at Bordeaux, in the latter year became professor of political economy at Montpellier, and in 1898 professor at the University of Paris and the Ecole des Ponts et Chaussées He was a leader in the movement towards "Christian Socialism" organized by French Protestants, and in his writings expressed the views of the classical French school of economics He became Chevalier of the Legion of Honor His publications include *Du droit d'association en matière religieuse* (1874), *Principes d'économie politique* (1884, 13th ed, 1911), *Etude sur l'Act Torrens* (1886), *La Coopération* (1900, 3d ed, 1910), *Les sociétés coopératives de consommation* (1904, 2d ed, 1909), *La séparation des églises de l'état* (1905), *Economie sociale les institutions du progrès social au début XX siècle* (1905, 4th ed, 1912), *Cours d'économie politique* (1909, 2d ed., 1911), and, with Charles Rist, *Histoire des doctrines économiques* (1909).

GIDEL, zhē'dĕl', CHARLES ANTOINE (1827–1900) A French author, born at Gannat (Allier) He was a professor successively at the Lycée Henri IV, the Lycee Louis le Grand, and the Lycée Condorcet His most important work is the *Histoire de la littérature française* (1874–91). His *Etude sur Saint-Evremond* (1866) received the Prix d'Eloquence from the Academy

GIDEON, gĭd'ē-on (Heb. *Gid'on,* perhaps connected with *gada',* to fell) A Hebrew warrior, also called Jerubbaal and once (2 Sam xi 21) Jerubbesheth According to the biblical narrative, Gideon delivered the Hebrews from the oppression of the Midianites and became one of the "judges" of Israel, and his son Abimelech was made "king" in Shechem (Judg vi–ix) Gideon and Jerubbaal are supposed by many scholars to be two distinct personages On this assumption Gideon belongs to the western section of Manasseh, Jerubbaal to the eastern, or perhaps to the tribe of Gad The stories regarding these heroes, after being confused in the minds of the people, are thought to have been combined by successive narrators into a single tale In the case of both heroes the opponents against whom they contend successfully are Midianites According to the original Gideon narrative, these Midianites choose the harvest time as the most favorable moment of attack, when they are certain of reaping a rich booty Gideon at Ophrah receives the summons through Yahwe to gather his clansmen in order to resist the expected attack of the nomads Warriors of Ephraim join with those of Manasseh, and the march is begun to Mount Gilboa, beneath which the Midianites are encamped Gideon approaches the camp stealthily and, encouraged by hearing one of the Midianites relating to his fellow a significant dream, returns to the Hebrew camp With the war cry "the sword of Yahwe and of Gideon" the Hebrews rush upon the Midianites, who are utterly routed and flee to the distant slope of Abel Meholah They are followed by the victorious Hebrews, who succeed in capturing two of the princes of the Midianites, Oreb and Zeeb, and their heads are brought to Gideon In the original Jerubbaal story the hero, residing at Jazer, is represented as proceeding with 10 members of his household at night against the Midianites and inflicting a slaughter upon them In revenge the Midianites turn against Jerubbaal's brethren, slay them, and go on plundering and killing far to the north Jerubbaal now gathers 300 warriors of his clan around him and, after enduring many hardships on the road, finally encounters the Midianites at Karkor By means of a stratagem he surprises and throws the Midianites into a panic, the result of which is a complete defeat of the marauders Jerubbaal captures the two kings of Midian, Zebah and Zalmunna, and puts them to death In the legendary amplification of this narrative Jerubbaal is recognized as King by his people, and since, as a worshiper of Yahwe, it seemed distasteful to later editors that he should have a name which contained Baal as an element, the name is interpreted and modified as though it indicated "opposition to Baal" (Judg vi 32), and in one instance (2 Sam xi 21) is disguised by substituting *besheth* for it (See BAAL) In general, however, the name "Gideon" is quietly substituted for "Jerubbaal" The similarity of the two stories no doubt was one element which led to their confusion in the minds of the people, but the combination is essentially the work of narrators who aimed at reconstructing the past from the point of view of zealous devotees of Yahwe In the course of the narratives stress is laid on the fact that the oppression of the Midianites is a punishment sent because the people had fallen away from Yahwe, while Gideon is represented as a devoted worshiper of Yahwe, who at the risk of his life destroys the Baal altars in his town (Judg vi 25–32) Consult the chapters on Gideon-Jerubbaal in the Hebrew histories of Stade, Kittel, Guthe, Wellhausen, and the commentaries on the Book of Judges by Studer, Bachmann, Moore, and Budde, also Niebuhr, *Studien zur Geschichte des alten Orients,* vol i (Berlin, 1894), Budde, *Richter und Samuel* (Giessen, 1890), Kittel, *Studien zur hebraischen Archaologie* (Leipzig, 1908)

GIEHRL, gērl, EMMY (1837–) A German writer of juveniles, born in Regensburg, daughter of the Bavarian Minister of Finance Von Aschenbrenner In 1858 she married Rudolf Giehrl, and after his death, in 1876, began writing for children, often under the pseudonym of "Tante Emmy" She brought out for more than 30 years a *Kinderkalendar* In 1894–99 a collected edition of her stories for children appeared in 15 volumes She also published *Erinnerungen aus meiner Jugend* (1899) and *Meine Lieder, was ich in funfzig Jahren singe* (1913).

GIERS, gērz, NIKOLAI KARLOVITCH DE (1820–95) A Russian statesman He served for some years in the Asiatic Department of the Ministry of Foreign Affairs and was sent as Minister Plenipotentiary to Teheran in 1863, to Bern in 1869, and to Stockholm in 1872 After his marriage into the family of Prince Gortchakov the latter made him his adjunct In 1882 Giers succeeded the Prince as Minister of Foreign Affairs, having meanwhile shown himself an astute diplomat in the negotiations with Great Britain on the Afghan boundary question, and in this position he distinguished himself by his wise con-

servatism and the maintenance of peaceful relations with other European powers

GIES, gēz, WILLIAM JOHN (1872–) An American biological chemist, born at Reisterstown, Baltimore Co, Md He graduated from Gettysburg College in 1893 and studied also at Yale (PhD, 1897), Bern, and Woods Hole, Mass A member of the faculty of Columbia University after 1898, he became in 1907 professor of biological chemistry, he was appointed professor of physiological chemistry in the New York College of Pharmacy in 1904 and in Teachers College (Columbia) in 1909, and prominently identified himself with the New York Botanical Gardens Besides much editorial work, especially for various scientific societies, his writings include *Biochemical Researches* (4 vols, 1903–09), *Text-Book of General Chemistry* (1904), *Text-Book of Organic Chemistry* (1905, 1909); *Laboratory Work in Biological Chemistry* (1906).

GIESEBRECHT, gē'ze-brĕkt, FRIEDRICH WILHELM BENJAMIN VON (1814–89) A celebrated German historian, born in Berlin He pursued historical studies at the University of Berlin as a pupil of Leopold von Ranke In 1857 he was appointed professor of history at Konigsberg and in 1862 accepted a call to Munich His *Geschichte der deutschen Kaiserzeit* (vol i, 1855–vol vi, 1895), a monumental undertaking for which the Berlin Academy awarded him the prize established by Friedrich Wilhelm IV in recognition of distinguished service to German history, is marked in the earlier volumes by much attractiveness of presentation and throughout by a minute and exacting investigation of sources Consult a memorial oration by Riezler (Munich, 1891)

GIESELER, gē'ze-lēr, JOHANN KARL LUDWIG (1792–1854) One of the greatest of Church historians He was born March 3, 1792, at Petershagen, near Minden, Westphalia, where his father was a clergyman He was educated at Halle and in October, 1813, entered the army as a volunteer during the War of Liberation In 1818 he was appointed to the directorship of a newly instituted gymnasium at Cleves and published his *Historisch-kritischer Versuch uber die Entstehung und die fruhesten Schicksale der schriftlichen Evangelien* In consequence of this publication he was called, in 1819, as professor of theology, to the University of Bonn, which had been established but shortly before It was in this place that he began his great work on Church history, of which three volumes appeared during his life, and two more after his death, under the editorship of E. R Redepenning (Bonn, 1823–52, 3 vols, in 8 parts, 4th ed of first four parts, 1844–48, 2d ed of fifth part, 1849, posthumous ed, vols. iv and v, 1854–55, Eng. trans, Edinburgh, 1846, 5 vols, with additions by H B Smith, New York, 1855–80, 5 vols) Vol. vi (1856) contains his *Dogmengeschichte* In 1831 Gieseler was called to a chair in Gottingen Besides numerous contributions to periodicals and publications on contemporary questions, he edited Euthymius Zygabenus, *Narratio de Bogomilis* (Gottingen, 1842), as well as Petrus Siculus, *Historia Manichæorum seu Paulicianorum* (Gottingen, 1846) He died at Gottingen, July 8, 1854 For his life by Redepenning, consult vol v of his *Kirchengeschichte* (vol i of the Eng trans by Smith)

GIESSBACH (gēs'bak) **FALLS** A picturesque cataract of Switzerland, in the Bernese Oberland, falling into Lake Brienz (q v) It consists of seven cascades formed by the Giessbach stream during a descent of 980 feet from its source in the Schwarzhorn The largest cascade has a fall of 190 feet

GIESSEN, gēs'sen A town of Hesse, capital of the Province of Upper Hesse, situated at the confluence of the Wieseck and the Lahn, 41 miles by rail north of Frankfort (Map Germany, C 3) It has a number of fine modern churches, an old Rathaus, a barracks, and a university The university, founded in 1607, was removed to Marburg in 1625 and reestablished at Giessen in 1650 It has four faculties (1535 students in 1913), a library of 261,747 volumes (1913), founded in 1617, a chemical laboratory arranged by Liebig (who was a professor here), botanical gardens, and several institutes and collections Giessen has also a teachers' seminary, a gymnasium, and a school of agriculture The chief trade of Giessen is in cigars and tobacco, employing more than 3000 hands, also lamps, furniture, safes, dyes lacquer, varnish, machinery, metal products, textiles, chemicals, musical instruments Pop, 1900, 25,491, 1910, 31,153, chiefly Protestants Giessen dates from the twelfth century

GIFFEN, gĭf'fen, SIR ROBERT (1837–1910). An English statistician and economist He was born at Strathaven, Lanarkshire, and was educated at the parish school in his native town, and at Glasgow College In 1860 he began newspaper work as a reporter on the staff of the Stirling *Journal* In 1862 he obtained a position on the London *Globe*, which he occupied until 1866, when he was engaged as assistant to John Morley, on the *Fortnightly Review* From 1868 to 1876 he was the assistant editor and principal contributor to the *Economist*, under the editorship of Walter Bagehot, and served during part of the same time (from 1873 to 1876) as city editor of the London *Daily News*, for which he furnished the daily trade and financial article In 1876 he was appointed chief of the statistical department of the Board of Trade He continued to hold office after it was merged, in 1882, with that of assistant secretary of the Board of Trade Another change in the organization of his department was made in 1892, when he was appointed comptroller general of the commercial, labor, and statistical departments He retired in 1897 From 1882 to 1884 he was president of the Statistical Society His writings include frequent contributions to the leading journals and magazines and the following publications *American Railways as Investments* (1873), *Stock Exchange Securities* (1878), *Essays in Finance* (1st series, 1879, 2d series, 1884), *The Progress of the Working Classes in the Last Half Century* (1884), *The Growth of Capital* (1890), *The Case against Bimetallism* (1892), *Economic Inquiries and Studies* (2 vols, 1904)

GIFFORD, gĭf'fērd, ADAM, LORD (1820–87) A Scottish jurist and philanthropist, born in Edinburgh He was admitted to the Scottish bar in 1849, and in 1861 was appointed advocate deputy and in 1865 sheriff of Orkney and Zetland In 1870 he became a judge of the Court of Sessions, with the title of Lord Gifford He gave by his will £80,000 to endow (the Gifford) lectureships in natural theology at the four Scottish universities—Edinburgh, Glasgow, Aberdeen, and St Andrews

GIFFORD, ROBERT SWAIN (1840–1905) An

American landscape painter and etcher He was born on the island of Naushon, Gosnold (Mass), and studied in New Bedford under A van Beest, a Dutch painter, from whom he acquired a certain Dutch quality of style He later traveled for purposes of study in Europe and northern Africa, and was one of the first Americans to choose subjects from those countries His most characteristic landscapes, however, depict the seashore or the moorlands They are well constructed, solidly painted, and full of virile sentiment, but unattractive in color He was equally proficient in water colors and oils and became a member of the New York Water Color Society in 1865, making his home in New York for three years In 1869 he visited California and Oregon The Metropolitan Museum, New York, possesses "Near the Coast" Other good examples of his work are "After the Rain," "Coast of Vineyard Sound," and "Saltworks, Dartmouth," exhibited at the St Louis Exposition (1904), "Cedar Tree Pasture and Ocean Sand Dunes," exhibited in 1905

GIFFORD, SANFORD ROBINSON (1823–80) An American landscape painter He was born at Greenfield, N Y, July 10, 1823, and studied with the water-color painter John R Smith of New York and was strongly influenced by Thomas Cole In 1851 he was elected associate of the Academy and in 1854 Academician He made a sketching tour through England and Scotland in 1855, then went to Paris, and in 1856 he visited Belgium, Holland, Switzerland, and Italy, spending the winter of the same year in Rome The following year he spent in the Abruzzi, Naples, and Austria Returning to New York at the beginning of the Civil War, he enlisted in the Seventh Regiment He remained with the army through the years 1862–63 In 1866 he went west with Whittredge and Kensett, and in 1868 he visited Greece, Syria, Egypt, Turkey, and Italy Gifford's pictures are expressive of the poetic and ideal qualities in landscape, they are rich and soft in color, and in them, for the first time in the American school, the interest is based entirely on artistic problems Among the best are "Morning in the Adirondacks" (1867), "San Giorgio, Venice" (1878), "Fishing Boats on the Adriatic", "The Ruins of the Parthenon" (1880), Corcoran Gallery, Washington, "Tivoli" and "Near Palermo," in the Metropolitan Museum, New York

GIFFORD, WILLIAM (1756–1826) An English author He was born at Ashburton, Devonshire, in April, 1756 Left an orphan at 12, he was first a cabin boy and then an apprentice to a shoemaker Aided by a local surgeon who had seen one of the boy's verses, he was sent to Exeter College, Oxford, where he was graduated B A in 1782 He now traveled on the Continent for "many years" as tutor to the son of Lord Grosvenor His first publication was the *Baviad* (1794), a satire on the writers known as 'Della Cruscans" (see DELLA CRUSCAN SCHOOL) This was followed by the *Mœviad* (1795), a similar satire on some of the contemporary dramatists, and by a savage attack on Dr John Wolcot (q v), entitled *An Epistle to Peter Pindar* (1800) Wolcot retaliated with the feeble *Cut at a Cobbler* In 1802 appeared a translation of Juvenal, which Gifford had begun at the university, and to which he now prefixed an autobiography Gifford, who had gained the favor of Canning and his political friends, edited the *Anti-Jacobin* in 1797–98, and in 1809 he was appointed the first editor of the *Quarterly Review* He was soon recognized as one of the severest reviewers of the time Having no sympathy with the new schools of poets and critics, he attacked Hazlitt, Hunt, Lamb, Wordsworth, Shelley, and especially Keats, with great bitterness (Consult review of Keats's "Endymion," in the *Quarterly*, April, 1818) He resigned from the *Quarterly* in 1824, having amassed a fortune of £25,000 He died Dec 31, 1826. and was buried in Westminster Abbey Gifford is perhaps best known to scholars by his editions of Massinger, Ben Jonson, and Ford, and notes to Shirley used by Dyce in his edition of the dramatist This work, however, was not done very carefully The *Baviad* and the *Mœviad* are in *British Poets*, ed by Frost (Philadelphia, 1838)

GIFT (AS, OHG. *gift*, from AS *gifan*, Goth *giban*, OHG *geban*, Ger *geben*, to give) Gift, in the broadest sense, includes every gratuitous transfer of property, whether real or personal, and whether made orally, by deed, or by will As a specific legal term, however, it is limited to a present transfer of property without consideration In this sense it is distinguishable from a devise or legacy on the one hand (which takes effect in the future, upon the giving owner's death) and from a barter, a grant, or a sale on the other, in each of which transactions a transfer is made upon a valuable consideration. Gifts are divisible into two classes, those *causa mortis* and those *inter vivos* The first class has been discussed in the article on DONATION (q v)

It has been judicially declared that the elements necessary to the validity of a gift *inter vivos* are the following (1) That the donor must be competent to contract, (2) there must be freedom of will, (3) the gift must be complete, with nothing left undone, (4) the property must be delivered by the donor and accepted by the donee, (5) the gift must go into immediate and absolute effect If either of the first two elements is wanting, the gift may be avoided and the property regained by the donor, because of his legal incapacity to transfer property, or because he was the victim of fraud duress, or undue influence In case, however, all these essentials are present, the transfer becomes irrevocable as between the donor and donee Even then, if it leaves the donor insolvent it may be set aside by his creditors as a fraudulent conveyance (q v)

The third essential of a gift—that it must be complete—distinguishes the transaction from a promise to give A person makes a present of his promissory note for $1000 to another Here is no gift, only a promise to give As a promise, it is unenforceable because there is no legal consideration for it Had the donor presented the donee with the promissory note of a third person, a gift would have been consummated Whether the delivery to another of the donor's check constitutes a gift of so much of his bank deposit as is named in the check, or is to be considered simply a promise to give, is a question upon which the courts are divided The weight of authority is in favor of the latter view Any substantial act on the part of the owner of property, tending to carry the gift into effect, and to give the donee dominion over the property so that he can appropriate it to his use, will amount to a valid and effectual gift Accordingly a savings-bank deposit may be of

fectually given to another by delivering to the latter the deposit book accompanied by an assignment, or by other acts which disclose the donor's intention to presently pass title and vest the donee with dominion over the fund Oftentimes a transaction which fails of effect as a gift is upheld by the courts as a declaration of trust (q v) in favor of the intended donee This will not be done, as a rule, unless it is apparent that the owner of the property actually intended to create a trust

Delivery of the property, which constitutes the fourth essential according to the judicial statement above referred to, may be actual or constructive, thus, if the property is already in the donee's possession, it is sufficient if the parties treat the property as thereafter owned as well as possessed by the donee Neither does the law require actual acceptance by the donee in all cases. If the gift is wholly beneficial to him, his acceptance will be presumed until evidence of rejection by him is given But it is in all cases essential that the possession of the property, if a chattel, shall be vested in the donee or, in lieu thereof, that a writing in the nature of a deed or a bill of sale be delivered to him In the case of real property a gift is properly effected by delivery of a deed of conveyance

The fifth requisite of a valid gift is that it go into immediate and absolute effect The words of donation must be those of present, complete, and final transfer to the donee Consult Kent, *Commentaries on American Law* (Boston, 1896), and the authorities referred to under CONTRACT

GIFTS, CONDITIONAL See DONIS CONDICIONALIBUS.

GIFU, gē'fōō A prefectural town of Japan, situated in the southern part of Nippon, 19 miles by rail from Nagoya (Map Japan, E 6). The chief products are silk and paper goods. Pop., 1903, 40,168, 1908, 41,488

GIGANTISM. See ACROMEGALY.

GIGANTOMACHIA. See GIANTS, PERGAMON

GIGNOUX, zhē'nyōō', FRANÇOIS RÉGIS (1816–82). A French landscape painter, born at Lyons He studied art at Lyons and in the Ecole des Beaux-Arts in Paris and with Delaroche In 1840 he came to the United States and became a member of the National Academy in 1851 He returned to France in 1870 His pictures are studies of nature in her more cheerful aspects and made quite a sensation in New York in the sixties They reflect the methods of the French masters of his day and exercised considerable influence upon the younger generation Among his productions are "Spring", "The First Snow", "The Indian Summer", "Niagara in Winter", "The Bernese Alps at Sunrise", "Niagara by Moonlight", "Mammoth Cave" (New York Historical Society), and "Winter Scene" (Corcoran Gallery, Washington) A number of his pictures are in private possession in New York City

GIGOUX, zhē'gōō', JEAN (1806–94) A French historical and portrait painter and illustrator, born at Besançon He was a pupil of the Besançon Academy and the Ecole des Beaux-Arts, Paris, and first exhibited in 1832 He soon became one of the strongest supporters of Delacroix in his revolt against idealism His best painting is "The Death of Leonardo da Vinci" (1835), in the Museum of Besançon It is a solidly painted, well-colored, realistic conception of the scene These traits characterize his other works "The Death of Cleopatra" (Bordeaux Museum), "The Eve of Austerlitz" (Besançon Museum), "The Capture of Ghent" (Versailles), "A Young Girl" (Compiègne Museum), and the portraits of Fourier and General Dwernichi, both in the Louvre Realism is also the dominant note in his religious paintings in Saint-Germain-Auxerrois and Saint-Gervais His drawings include 600 designs on wood for an edition of *Gil Blas* His collection of drawings and lithographs was left to his native town He wrote an interesting book, *Causeries sur les artistes de mon temps* (1855), full of anecdote and art talk He received the medal of honor at the Paris Exposition of 1889 and the cross of the Legion of Honor in 1880

GIGUE, zhēg See JIG

GIHON, gī'hŏn, ALBERT LEARY (1833–1901) An American physician, born in Philadelphia Graduating in 1852 at the College of Medicine and Surgery in that city, he remained for two years as professor of chemistry and toxicology He became an assistant surgeon in the United States navy in 1855, surgeon in 1861, and medical director in 1879 In 1895 he became senior medical director of the navy and in the same year was retired with rank of commodore He designed the model hospital ship exhibited at the Centennial Exhibition of 1876 and invented an ambulance cot, adopted in 1877 under his name, for use in the navy At various times he was president of the American Public Health Association, the American Academy of Medicine, and the Association of Military Surgeons of the United States He wrote *Practical Suggestions in Naval Hygiene* (1871), and many papers, reports, and fugitive articles

GIJÓN, hē-hōn' An important seaport in the Province of Oviedo, Spain, on the Bay of Biscay, 20 miles by rail north-northeast of the city of Oviedo (Map Spain, C 1) One of the most flourishing towns of Asturias, its population has increased with the development of its commerce and its growing popularity as a watering place The town is well built, the more modern quarters with wide, straight streets and a number of new buildings, including markets, and a town hall, but the old section towards Santa Catalina Point is walled and has many quaint mediæval buildings There are statues in honor of Pelayo and Gaspar de Jovellanos, the latter a native of Gijón, who in 1794 founded the Instituto Jovellanos, which has a valuable art collection and a library of 5500 volumes, and the Campos Elíseos with a theatre, circus, and extensive gardens Gijón has also a large bull ring and fine promenades, the parish church of San Pedro (fifteenth century) and the two palaces are also interesting One of the old ecclesiastical buildings has been converted into a government tobacco factory which employs 1400 persons The manufacturing establishments comprise also glass and pottery works, foundries and machine shops, wire and wire-nail factories, and petroleum refineries, soap, preserved foods, candles, and chocolate are made in Gijón The town, including a considerable area that is chiefly mountainous, is the chief port for the rich mining districts of Oviedo and carries on an extensive export trade in coal, copper, iron, and other minerals, lumber, and nuts The coastwise trade is also important, and there are large fisheries Increased railroad facili-

ties and improvements in the harbor have promoted its commerce Pop, 1900, 47,326, 1910, 52,226 Gijón is identified with the ancient Gigia, or Gijia, though not on the exact site of the Roman town Captured by the Arabs, it fell into the hands of Pelayo after the battle of Covadonga, in 722, and until near the close of the eighth century was the capital of the Asturian princes The shattered "Invincible Armada" repaired here in 1588

GILA (ē'la) **MONSTER** (after the *Gila*, a river in Arizona) A poisonous lizard (*Heloderma suspectum*) found in the sandy deserts of Arizona, New Mexico, and Texas It is one of the largest lizards in North America, is closely allied to the caltetepon (*Heloderma horridum*) of Mexico, and is fat, inactive, and stupid It is covered with bright orange and black pebble-like scales, and, like snakes, it has grooved teeth with large salivary glands at their bases Its bite is injurious, though not often fatal to man. Drs S Weir Mitchell and E F Reichert found that the saliva injected into pigeons and fowls was quickly mortal, but the experiments of Dr Irwin of the United States army (1862–63), of Dr H C Yarrow of the United States National Museum, and of Samuel Garman, have failed to substantiate the earlier conclusions, so that the question of the poisonous nature of this lizard is not definitely settled An illustrated monograph upon its anatomy was contributed by Shufeldt to the Zoological Society of London and printed in their *Proceedings* (London, 1900) See HELODERMA, and Plate of IGUANA AND OTHER AMERICAN LIZARDS

GILA (hē'la) **RIVER.** A river of the United States, which, rising in the Sierra Madre Mountains (q v) in New Mexico, and, flowing in a westerly direction across Arizona, joins the Colorado about 120 miles above where the latter empties into the Gulf of California (Map Arizona, C 4) For the greater part of its length, which is nearly 500 miles, the Gila flows through mountain cañons, the sides of which are in many places so precipitous as to render the stream almost unapproachable The lower part of its course is through an open and comparatively level country, much of which is made fertile by irrigation from the river Ruined edifices, one of which is three stories high and in a fair state of preservation, broken pottery, and traces of irrigation canals along its banks show that its riparian dwellers of former times were numerous and partly civilized About 200 miles from its mouth, in a productive portion of the valley, is the reservation of the Pima and Maricopa Indians

GILAN, gē-lān'. See GHILAN.

GILBERT, gil'bērt, ALFRED (1854–) An eminent English sculptor and goldsmith He was born in London, the son of a distinguished musician, and studied under Boehm, at the South Kensington Art Schools, and under Cavalier at the Ecole des Beaux-Arts, Paris His individual style was formed in Florence and Rome, where he was profoundly impressed by the Renaissance sculptors Gilbert took rank as the most original sculptor of the late nineteenth and early twentieth century in Great Britain, and his influence on the art of his native land has been profound and wholesome He excels especially in the art of metal work, which he did most to revive in England In this regard, as well as in his sculpture, he has aptly been compared to Benvenuto Cellini Like him he excels in decoration, sometimes indeed to the detriment of his sculpture, the effect of which is interfered with by his love of ornament Although somewhat minutely executed, his work abounds in color and in rhythm He has an acute sense of beauty and an imaginative fancy and exaggeratedly high ideals, which have often caused him to destroy fine creations His early sculptures, which are chiefly ideal, include "Mother and Child", "The Kiss of Victory" (1882), "Perseus" (1883, showing the influence of Florentine sculpture), "Study of a Head", "Icarus" (1884), an admirable nude In 1888 he modeled the seated statue of Queen Victoria for Winchester, perhaps the most remarkable work of its kind in Great Britain His portraits, which interpret the spiritual as well as the physical, include busts of Dr Joule (City Hall, Manchester), G F Watts, Sir Henry Tate, and statues of Lord Reay (Bombay) and John Howard at Bedford Among his monumental works are the strikingly original Fawcett Memorial in Westminster Abbey, the less successful Shaftesbury Memorial Fountain in Piccadilly Circus, London, the Caldecott Memorial in the crypt of St Paul's, a memorial baptismal font (1900), and his greatest achievement, the tomb of the Duke of Clarence in Windsor Chapel As a goldsmith, he produced many beautiful works, including the epergne presented to Queen Victoria on her Jubilee, chains, statuettes, and other small objects Gilbert was elected to the Royal Academy in 1892 and appointed professor of sculpture in 1900, but resigned from the Academy in 1909. In 1897 he was made a member of the Victorian Order He entered on a life of almost monastic seclusion in Bruges Consult Hatton, *The Life and Work of Alfred Gilbert* (London, 1903)

GILBERT, MRS ANNE HARTLEY (1821–1904) A popular American actress She was born in Lancashire, England, and in her youth became a dancer In 1846 she was married to George H Gilbert, with whom, after appearing in many of the British theatres, she came to America in 1849 Her first hit in a speaking part was as Wichavenda in Broughman's *Pocahontas* (1857) In 1869 she joined Daly's company and became well known in the characters of the odd elderly ladies of the stage, such as Mrs Candour in *The School for Scandal*, Mrs Hardcastle in *She Stoops to Conquer*, and many others After Mr Daly's death she came under Charles Frohman's management and later became a member of Annie Russell's company Mrs Gilbert published her stage reminiscences in 1901 Consult W Winter, *The Wallet of Time* (2 vols, New York, 1913).

GILBERT, CASS (1859–). A distinguished American architect, born at Zanesville, Ohio, and educated at Massachusetts Institute of Technology He began practice in 1883 His greatest achievement is the Woolworth Building, New York Among other buildings planned by him are the Minnesota Capitol, at St Paul, Essex County Court House, Newark, N J, Agricultural Building at the Omaha Exposition (1897), Brazer Building in Boston, New York Custom House, Art Building and Festival Hall at the St Louis Exposition, and the Central Public Library, St Louis He also made the general plans for the universities of Minnesota and Texas and the Arkansas Capitol, and was one of the architects of the new Union Club in New York He was appointed by President

Roosevelt to the Council of the Fine Arts and by President Taft to the Commission of Fine Arts, was one of the founders, and a president, of the Architectural League, New York, and president of the American Institute of Architects in 1908–09, and was elected a member of the National Academy in 1908, and of the American Academy of Arts and Letters in 1914, besides receiving notable recognition abroad

GILBERT, CHARLES BENAJAH (1855–) An American educator, born at Wilton, Conn. He graduated at Williams College in 1876 and was principal of high schools at Mankato, Winona, and St Paul, Minn, and Beaver Dam and Oshkosh, Wis From 1889 to 1896 he was superintendent of schools at St Paul, from 1896 to 1900 at Newark, N J, and from 1900 to 1903 at Rochester, N Y In 1903–04 he edited educational publications He was president of the National Association of School Superintendents in 1897 and in 1897–1900 lectured at Teachers College, Columbia University In 1906 he became lecturer on education in Western Reserve University He wrote *The School and its Life* (1906) and *What Children Study and Why* (1913) He also compiled, or directed the preparation of, *American School Readers* (7 vols.), *Arithmetic* (3 vols), *Stepping Stones to Literature* (8 vols), *Stories of Heroes* (6 vols), and other publications

GILBERT, CHARLES HENRY (1859–) An American ichthyologist, born at Rockford, Ill He graduated from Butler University in 1879 and studied also at Indiana University (Ph D, 1883), where he taught in 1880–84, and to which he returned, after several years at the University of Cincinnati, to be professor of zoology in 1889–91 After 1891 he was professor of zoology at Leland Stanford He was connected with the United States Fish Commission in 1880–98, and in 1902 and 1906 made important explorations for it, and for the Bureau of Fisheries he conducted salmon investigations in 1909–13 His publications include *Synopsis of the Fishes of North America*, with David Starr Jordan (1882), *The Deep Sea Fishes* (of the Hawaiian Islands) (1905), *Lantern-Fishes of Japan* (1913), and official reports and bulletins

GILBERT, DAVID MCCONAUGHY (1836–1905) An American clergyman and author, born at Gettysburg, Pa He studied there at Pennsylvania College and the theological seminary of the Lutheran church and was ordained in 1860 a Lutheran minister He was pastor at Staunton, Va., in 1859–63 and 1871–73, at Savannah, Ga, in 1863–71, and at Winchester, Va, after 1873 In 1886 he was elected first president of the United Southern Synod of the Lutheran Church Among his publications are *The Lutheran Church in Virginia, 1776–1876* (1876), *The Synod of Virginia Its History and Work* (1879), *The Annihilation Theory Briefly Examined* (1879)

GILBERT, gil′bĕrt, GROVE KARL (1843–1918) An American geologist, born in Rochester, N. Y He graduated from the university in that city in 1862 For several years he studied geology and paleontology with Prof H A. Ward, of Rochester, supplementing his studies by field work with the Ohio Geological State Survey in the capacity of assistant In 1871 he received an appointment to the United States Geological Survey As assistant to Major J. W Powell, the director of the Survey, he was engaged from 1875 to 1879 in mapping and describing the geology of portions of the Rocky Mountain region Entering the service of the United States Geological Survey in 1879, from 1889 to 1892 he was chief geologist He was special lecturer at Cornell (1886), Columbia (1892), and Johns Hopkins (1895–96) In 1885 and 1886 he was president of the American Society of Naturalists, in 1899 president of the National Academy of Sciences, and in 1892 and 1909 president of the Geological Society of America One of the first to study the relations between geological structure and surface features, a branch of science now known as physiography, he wrote *Report on the Geology of the Henry Mountains* (1877), *Report on the Geology and Resources of the Black Hills of Dakota* (1880), *The Topographic Features of Lake Shores* (1885) *Lake Bonneville* (1890), *Introduction to Physical Geography* (1902, new ed, 1908), *Glaciers and Glaciation* (1904), being vol iii of the report of the Harriman Alaska expedition

GILBERT, SIR HUMPHREY (?1539–83) An English soldier and navigator He was born at Compton, Devonshire, and was, on his mother's side, a half brother of Sir Walter Raleigh He was educated at Eton and at Oxford He saw active service in Normandy under the Earl of Warwick in 1563 as well as in the Irish campaigns of 1566–70 In 1566 he joined Anthony Jenkinson in a petition to the Queen regarding a project for the discovery of a northeast passage to Cataia, and the year following he petitioned alone regarding an attempt to find a northwest passage In 1572 he was sent into the Netherlands with a force of 1500 English volunteers to aid the Dutch After a futile campaign he returned to England and spent the next five years in retirement in "sundry profitable and very commendable exercises" in literature During this period he wrote the *Discourse of a Discovery for a New Passage to Cataia*, produced partly in support of his petition of 1566 The *Discourse*, with some additions, was edited by the poet George Gascoigne in 1576 In 1577 Gilbert published another treatise, suggesting a plan of "reprisals" against the King of Spain, and in 1578 he received a commission from Elizabeth, which covered the privileges of discovery and colonization An expedition was immediately fitted out by Gilbert and Sir Walter Raleigh, but was dispersed by the Spaniards off Cape Verde, and the next four years were spent by the indefatigable adventurer in endeavors to raise the necessary funds for another undertaking On June 11, 1583, he sailed from Plymouth with five ships, but the largest—a bark furnished by Raleigh—returned to England after two days at sea. Gilbert made his way across the Atlantic, and on July 30 reached the coast of Newfoundland, and determined to plant his colony near the harbor of St John's, where he took possession of the country in the name of the Queen This, the first English colony in America, was made up of broken-down gentlemen and seamen, and the lawlessness of the community was beyond Gilbert's control Arrangements were made to return to England, whence Gilbert hoped to make another attempt at colonization in the following spring Meanwhile he explored the coast of Newfoundland towards the south and lost his largest ship on the shoals off Cape Sable or Cape Breton Island Disregarding the advice of his friends, he persisted in sailing in the

Squirrel, the smaller and less seaworthy of the two remaining vessels A storm was encountered off the Azores "On Monday, September 9th," reports Hayes, the captain of the other vessel, the *Golden Hind*, "the frigate was near cast away, yet at that time recovered, and giving forth signs of joy, the general, sitting abaft with a book in his hand, cried out unto us in the *Hind* 'We are as near to heaven by sea as by land' That same night the watch on board the *Hind*, observing that the frigate's lights suddenly disappeared, cried out 'The general was cast away,' which was too true, for in that moment the frigate was devoured and swallowed up in the sea" Consult Bourne, *English Seamen under the Tudors* (London, 1868), and Markham, *The Fighting Veres* (ib, 1888) The original narrative of his voyage is in Hakluyt, *English Voyages* (ib, 1600, new ed, 1812, Goldschmid, Edinburgh, 1889). Consult also Adams, *English Heroes in the Reign of Elizabeth* (Edinburgh, 1902), and Slafter, *Sir Humfrey Gylberte and his Enterprise* (Boston, 1903)

GILBERT, JAMES ELEAZER (1839–1909) An American Methodist Episcopal clergyman, born in Alexander, N Y, and educated at Genesee College He was city editor of the Buffalo *Courier*, associate editor of the Buffalo *Christian Advocate*, and editor of the *Sunday School Standard* He also served as principal of public schools at Buffalo and at Dayton, Ohio Entering the ministry in 1872, he thereafter held pastorates at Cincinnati, Ohio, Lexington, Ky, Topeka, Kans, Milwaukee, Wis, Grand Rapids, Mich, and Indianapolis, Ind He founded the *Kansas Methodist* at Topeka, and established the Teachers' Normal College at Milwaukee In 1889 he organized and became president of the American Society of Religious Education He is author of *Preparation for Church Membership* (1903), *Religious Experience* (1904), *Biblical Doctrine* (1904), *American Methodism* (1904)

GILBERT, SIR JOHN (1817–97) An English historical painter, illustrator, and engraver He was born at Blackheath, July 21, 1817 He learned every technique possible for art expression—oils, water color, fresco, wood and stone engraving, etching, carving, and drawing—and was in the main self-taught, except for a few lessons in the use of color from George Lance Gilbert gave most of his attention to illustration, in 1838 beginning with illustrations of a book of nursery rhymes These were followed by illustrations for the editions of the poets—Cowper (1841), Pope, Burns, and others included in Routledge's *British Poets* (1853), *Evangeline* (1856), Longfellow's *Poems* (1858). Scott (1857), Wordsworth (1859), Milton (1864) His chief work was 829 illustrations for Howard Staunton's edition of Shakespeare (1856–60), the proofs of which are in the collections of the British Museum He also illustrated numerous religious books, novels, children's tales, and anthologies

In 1843 he sent a few drawings to *Punch*, designing the cover for that year, but for 30 years, following the establishment of the *Illustrated London News* in 1842, he was a constant contributor, furnishing it about 30,000 woodcuts He also drew for the London *Journal* In 1852 he was elected an associate of the Water-Color Society and a full member in 1854 He initiated the exhibitions of this society in 1862, leading the way to a regular winter exhibition Gilbert was made president of the society in 1871, on which occasion he was knighted His oil paintings were exhibited at the British Institution and the Royal Academy, of which he was appointed a member in 1876 Among the best are "Rembrandt" (1867), "Naseby" (1873) "Richard II Resigning the Crown" (Liverpool Gallery), "Doge and Senators of Science," and several subjects from *Don Quixote* In 1893 he presented to the nation a collection of his works, which were divided among the galleries in London, Birmingham, Liverpool, and Manchester To the Royal Academy he presented his sketch-books His life was uneventful, his industry was marvelous, as the prodigious number of his drawings and paintings testifies He died at Blackheath, Oct 5, 1897 He was a great draftsman and illustrator rather than a painter, although he was a good colorist, with a fondness for red, yet he often made his shadows too black Consult Spielman, "Sir John Gilbert," in the *Magazine of Art* (London, 1898), and Atkinson, *English Artists of the Present Day* (ib, 1872)

GILBERT, JOHN GIBBS (1810–89) An American comedian, whose real name was Gibbs Born in Boston, he made his first appearance there at the Tremont Theatre, in 1828, as Jaffier in *Venice Preserved* His original aim was to be a tragedian, but while on a tour through the South and West, the success of his Sir Anthony Absolute, Master Walter, etc, convinced him that his true bent was for "old men" parts, and he soon became the leading American actor in that line of comedy In 1847 he had a successful engagement in London From 1862 until the close of Wallack's Theatre, New York, he was connected with that house His most famous rôle was that of Sir Peter Teazle in *The School for Scandal*, his Sir Anthony, Old Dornton in *The Road to Ruin*, and Lord Ogleby in *The Clandestine Marriage*, were also noted Consult Winter, "A Sketch of the Life of John Gilbert," *Dunlap Society Publications* (New York, 1890), McKay and Wingate, *Famous American Actors of To-Day* (ib, 1896), Carroll, *Twelve Americans Their Lives and Times* (ib, 1893)

GILBERT, SIR JOHN THOMAS (1829–98). An Irish antiquary, born in Dublin. He received his education at Bective College in Dublin and at Prior Park College in Bath. His antiquarian tastes developed early In 1855 he became one of the honorary secretaries to the Irish Celtic and Archæological Society and took an active part in organizing the new public record office at Dublin, of which he was appointed secretary (1865–75) In 1855 he was elected to the Royal Irish Academy, of which he was librarian for a quarter of a century and finally vice president He also held many positions of public trust In 1892 he received the degree of LL D from the Royal University, and in 1897 he was knighted Gilbert's researches in the sources of Irish history are of the very highest value Among his works are *Historical Essays on Ireland* (1851), *Celtic Records and Historical Records* (1852), *History of the City of Dublin* (3 vols, 1854–59), *Ancient Historical Irish Manuscripts* (1861), *Public Records of Ireland* (1863), which consists of a letter addressed to the Lords Commissioners of the Treasury on the condition of the public records, and was followed by a work of a similar nature entitled *Records Revelations Resumed* (London,

1864), *History of the Viceroys of Ireland* (1865), *A Contemporary History of Affairs in Ireland from 1641 to 1652* (1879–80, 4 vols), *Account of Facsimiles of National Manuscripts of Ireland* (5 vols, 1874–84), *Chartularies of St Mary's Abbey, Dublin* (2 vols, London, 1884), containing also the register of its house at Dumbrody and the *Annals of Ireland, History of the Irish Confederation and War in Ireland, 1641–1649* (7 vols, 1882–91), *Calendar of Ancient Records of Dublin* (8 vols, 1889–98), *A Jacobite Narrative of the War in Ireland* (1892), *Documents Relating to Ireland* (1893), *Crede Mihi, the Most Ancient Register of the Archbishops of Dublin before the Reformation, A D 1275* (1897) He also edited numerous volumes of manuscripts of the Earl of Charlemont (1891–94), of Trinity College (1881), of the Earl of Fingall (1885), of Charles Haliday (1897), and many others Consult Gilbert, *Life of Sir John T Gilbert* (2 vols, London, 1905).

GILBERT, Sir Joseph Henry (1817–1901). An English agricultural scientist, born at Hull (Yorkshire), son of Joseph Gilbert (1779–1852), a well-known Congregational minister, and of Ann Taylor, the author, with her sister Jane, of *Original Poems for Infant Minds* and *Hymns* He studied at Glasgow University, at University College, London, and at the laboratory of Liebig, University of Giessen, and in 1840–43 was successively assistant to Prof A. T Thompson at University College and chemist to a calico manufactory near Manchester In 1843 he became associated with Mr (later Sir) J B Lawes (q v) in the agricultural experiment station established upon Lawes's estate at Rothamsted (near St Albans, Hertfordshire). He was director of the laboratory from 1843 until the death of Lawes in 1900 and then director of the station He was professor of rural economy at Oxford in 1884–90 In 1860 he was elected a fellow of the Royal Society and in 1882–83 was president of the Chemical Society, of which he had been elected a member in 1841 He traveled in the United States in 1882, 1884, and 1893 The combined services of himself and Lawes to the development of agricultural chemistry, dating from the establishment of the Rothamsted station, one of the first of such institutions, have been epoch-making He was knighted in 1893, 50 years after the beginning of the Rothamsted experiments. In addition to a large number of essays prepared with Lawes for the *Journal* of the Royal Agricultural Society of England, the *Journal* of the Chemical Society, the *Transactions* of the Royal Society, and various other periodicals and reports, he wrote *Amount and Composition of the Rain and Drainage Waters at Rothamsted* (1882, with Lawes and Warington) and *Agricultural Investigations at Rothamsted, England, during a Period of Fifty Years* (1895, Bulletin 22 of the United States Office of Experiment Station)

GILBERT, Linda (1847–95) An American philanthropist She was born in Rochester, N Y, but when very young was taken by her parents to Chicago, where she was educated in St Mary's Convent She became interested in the cause of prison reform, and through her efforts libraries aggregating 30,000 volumes, and ranging from 1500 to 2000 volumes each, were placed in various prisons throughout the country She was also instrumental in bringing about the incorporation of the Gilbert Library and Prisoners' Aid Society, under the laws of the State of New York, having for its object the improvement of prison discipline, the placing of selected libraries in every prison and jail, the care of prisoners' families when in need, and the assistance of those discharged from prison The greater part of her work was done in her individual capacity, the society, through lack of funds, having been prevented from proceeding far with the work for which it was organized

GILBERT, zhēl'bâr', Louis Philippe (1832–92) A Belgian mathematician, born at Beauraing (Namur) He was a professor at the University of Louvain, a member of the Royal Academy of Belgium, and a correspondent of the Institute of France His published works, chiefly on pure mathematics and their history, include a *Cours de mécanique analytique* (1877) and *Recherches sur les propriétés géométriques des mouvements plans* (1878)

GILBERT, Nicolas Joseph Florent (1751–80) A French poet, born at Fontenay-le-Château, Lorraine He had already written some mediocre verse and a novel when he went to Paris in 1772 He presented a poem at the Academy, which was not well received He wrote the satires *Le dix-huitième siècle* (1775) and *Mon apologie* (1778), some odes, and a few days before his death his best-known poem, "Adieux à la vie" He has been called the French Juvenal and a French Chatterton, and it was said that he died of want, but he was in receipt of three pensions at the time Alfred de Vigny made a hero of him in *Stello* His complete works were first published in 1788, and they have several times been reprinted—in 1882 by Lescure Consult Laffay, *Le poète Gilbert* (Paris, 1898), and Schmit's "Notice" in *Mémoires de la Société d'Archéologie Lorraine*, vol. xl (Nancy, 1890)

GILBERT, gil'bẽrt, Rufus Henry (1832–85). An American physician and inventor After graduating at the College of Physicians and Surgeons in New York City, he began medical practice at Corning, N Y At the outbreak of the Civil War he became a surgeon in the Duryea Zouaves (Fifth New York Infantry) and rose to be medical director and superintendent of the Central Railroad of New Jersey Afterward he made a study of the rapid-transit problem in New York City, as a result of which he devised the elevated railway, originally in tubular pneumatic form, but afterward more nearly resembling the present system Under his direction the Sixth Avenue Elevated Railway (in New York City), then known as the Gilbert Elevated Railway, was constructed In 1878 the management of the railway was assumed by the Metropolitan Transit Company Charges of fraud were subsequently made by Dr Gilbert against his associates, and much litigation followed

GILBERT, Saint See Gilbertines

GILBERT, William (1540–1603) A distinguished English natural philosopher and physician, who has been termed "the father of magnetic philosophy." He was born at Colchester, of which town his father was recorder He was a member and subsequently fellow of St John's College, Cambridge, was B A in 1560, M A in 1564, and M D in 1569 About the year 1573 he settled in London as a practicing physician, joined the College of Physicians, and was appointed physician to Queen Elizabeth. The time that he could spare from the duties of his pro-

fession was employed in philosophical experiments, particularly in relation to the magnet, and in these he was assisted by a pension from the Queen After holding various offices in the College of Physicians he was finally elected its president in 1600 At the death of the Queen in 1603 he was continued in his office of court physician by James I until his death, a few months later Gilbert's death seems to have taken place in London, but he was buried at Colchester, in the church of the Holy Trinity, where there is a monument to his memory He left his library, globes, instruments, and cabinet of minerals to the College of Physicians From his birthplace, he is generally designated as Gilbert of Colchester His important works are *De Magnete, Magneticisque Corporibus, et de Magno Magnete, Tellure, Physiologia Nova* (1600), of which there are several editions, and *De Mundo Nostro Sublunari Philosophia Nova* (1651), published from a manuscript in the library of Sir William Boswell The first of these works has served as the basis of subsequent investigations in terrestrial magnetism and contained all the fundamental facts of the science as they were known at that time Gilbert establishes the magnetic nature of the earth, which he regards as one great magnet, and discusses variations and the bearing of magnetic phenomena on navigation He was the first to use the terms "electric force," "electric attraction," and "magnetic pole," and to point out that amber is not the only substance which, when rubbed, attracts light objects, but that the same faculty belongs to the resins, sealing wax, sulphur, glass, etc These substances he termed "electrics," while the metals and other material which would not exert the force of attraction upon being rubbed he called nonelectrics. The publication of his treatise *De Magnete*, which was the first great work on physical science to be published in England, will always be regarded as constituting an epoch in the history of magnetism and the allied sciences Consult William Gilbert of Colchester, *On the Loadstone and Magnetic Bodies, and on the Great Magnet, the Earth*, trans. by Mottelay (London, 1893), which contains a biographical memoir, also another translation with notes by S P Thompsen, published by the Gilbert Club of London (ib, 1900)

GILBERT, Sir William Schwenck (1836–1911) An English dramatist, best known for the comic operas in which he collaborated with the composer, Sir Arthur Sullivan He was born in London and graduated at London University. From 1857 to 1862 he was a clerk in the Privy Council office, in 1864 he was called to the bar of the Inner Temple He had been a contributor to *Fun* (for which he wrote his well-known *Bab Ballads*) and to other periodicals for several years, when in 1866 he wrote his first play, a burlesque called *Dulcamara* It was the first of a long list Among his comedies, after such light pieces as *The Merry Zingara* and others, came *The Palace of Truth* (1870), *Pygmalion and Galatea* (1871), *The Wicked World* (1873); *Sweethearts* (1874), *Broken Hearts* (1876), *Dan'l Druce* and *Engaged* (1877) In 1871 he and Arthur Sullivan began to work together Their most famous pieces are *H. M S Pinafore* (1878); *The Pirates of Penzance* (1879); *Patience, or Bunthorne's Bride* (1881), *Iolanthe* (1882), *The Mikado* (1885), *The Gondoliers* (1889). In 1891 Gilbert published a collection of his songs under the title *Songs of a Savoyard* (reprinted in 1897). *The Mountebanks* he produced in 1892 with Alfred Cellier, *His Excellency* and *The Grand Duke* are among later productions He was knighted in 1907 Consult W Winter, *The Wallet of Time* (2 vols, New York, 1913)

GILBERT DE LA PORRÉE, zhêl'bâr' de la pō'rā', or, in Latinized form, Gilbertus Porretanus (1070–1154) A scholastic theologian He was born at Poitiers, France, 1070, educated at Chartres, and became Bishop of Poitiers in 1142 He was accused of heresy regarding the Trinity by Bernard of Clairvaux and was tried at Rheims (1148) On promising to correct his errors he was allowed to go free He was influential in introducing the Aristotelian philosophy His chief works were a *Commentary* on Boethius on the Trinity, and *The Sex Principia*, long used as a textbook of the Aristotelian principles Both are printed in Migne, *Patrol Lat*, lxiv and clxxxviii Consult his life by Berthaud (Paris, 1892)

GILBERTINES, gil'bēr-tīnz An English religious order, founded about 1130 by St Gilbert, a native of Sempringham in Lincolnshire He first established a convent of seven nuns, besides lay sisters, and prescribed for them the Benedictine rule. He intended to place them under the direction of the Cistercians, but when (1147) this did not seem practicable he founded a congregation of priests and lay brothers to have the care of the nuns, while dwelling in a separate cloister To these he gave the rule of St Augustine modified by Cistercian discipline The foundation was confirmed by Eugenius III in 1148, and at the founder's death in 1189 had 13 cloisters, of which nine were double It continued to flourish until the dissolution of the monasteries Consult Graham, *Saint Gilbert of Sempringham and the Gilbertines* (London, 1901), and Gasquet, *Henry VIII and the English Monasteries* (ib, 1899)

GIL'BERT ISLANDS An archipelago in Oceanica, situated on the equator and between long 172° and 177° E, southeast of Marshall Islands (Map Australasia, K 2) It consists of 18 small inhabited islands, mostly atolls, covering a total area of about 166 square miles. The largest of them are Tapiteuea, Aroraı, Nonuti, Apamama, Maiana, and Maraki The climate is favorable The chief product of the group is copra The population, stated in 1911 at 26,871, is chiefly natives imperfectly civilized, but including a number of converts to Christianity, they are a Micronesian people, but with a strong admixture of Polynesian, the source of this contamination being identifiable on linguistic grounds as Samoan Sixteen of the islands form two groups designated Ni-Makin and Ni-Peru, distant western outliers are Paanapa and Nauru, the site of extensive phosphate digging, the latter a German possession The group was first discovered by Saavedra in 1529 and rediscovered by John Byron in 1765 They came into British possession in 1892 and are administered by the High Commissioner of the Western Pacific in Fiji through a resident deputy Consult Kramer, *Hawaii, Ostmikronesien und Samoa* (Stuttgart, 1906); Elschner, *Carallogene-Phosphat-inseln* (Hamburg, 1913), Bingham, *Gilbertese-English Dictionary* (Boston, 1908)

GIL'BERTON. A borough in Schuylkill Co, Pa., 4 miles west by south of Mahanoy City, on

the Philadelphia and Reading, and the Pennsylvania railroads (Map Pennsylvania, J 5) It has extensive coal mines Pop, 1900, 4373, 1910, 5401

GILBERTUS PORRETANUS. See GILBERT DE LA PORRÉE

GIL'BEY, SIR WALTER (1831–1914) A British wine merchant and horse breeder He was born at Bishop Stortford, Hertfordshire, England, began life in an estate agent's office, subsequently obtained a clerkship in a parliamentary agent's office, and during the Crimean War served in the convalescent hospital at the Dardanelles Returning to London, he set up a retail wine and spirit trade with his brother Alfred in 1857 and thereby accumulated a large fortune He was knighted in 1893 Gilbey was president of the Shire Horse Society in 1883 and 1897, of the Hackney Horse Society from 1889 to 1904, and of the Royal Agricultural Society in 1895 He published *The Harness Horse* (1898), *Animal Painters in England from 1650* (2 vols, 1900); *Thoroughbred and Other Ponies* (1903), *Hunter Sires* (1903), *Poultry Keeping* (1904); *Horses, Breeding to Color* (1907), *Pig in Health* (1910), *Sport in the Olden Time* (1912), *Hounds in the Old Days* (1913).

GIL BLAS, zhēl blas See LE SAGE

GILBOA, gĭl-bō'a (perhaps an early corruption of Heb *gib'ath habba'al*, hill of Baal) The biblical name of a range of hills on the eastern side of the plain of Esdraelon (q v) Their height varies from a few hundred to 2000 feet The hills were the scene of the death of King Saul and his three sons, after their defeat by the Philistines (1 Sam xxxi, 2 Sam i 6, 1 Chron x 1–8). The modern name of the hills is Jebel Fuku'a

GIL'BRETH, FRANK BUNKER (1868–). An American contracting engineer, born at Fairfield, Me. He practiced in Boston from 1895 to 1904 and after that in New York City. He became director of the Summer School of Management for Professors of Engineering and Economics Deeply interested in problems of efficiency, he founded international museums for elimination of unnecessary fatigue among workers and introduced micromotion study and processes for determining efficient methods of work His publications include *Field System* (1908), *Concrete System* (1908), *Bricklaying System* (1909), *Motion Study* (1911), *Primer of Scientific Management* (1912), and, with his wife, *Time Study, the Science of Obtaining Methods of Least Waste*

GILCHRIST, gĭl'krĭst, ALEXANDER (1828–61) An English biographer, born in London He studied law at the Middle Temple and was called to the bar in 1849, but relinquished a legal career for that of a man of letters His contributions to the *Eclectic Review*, the *Literary Gazette*, and the *Critic* were numerous. His chief work is his *Life of William Blake* (1863). He wrote also a *Life of William Etty, R A* (2 vols, 1855) He was a friend of D G Rossetti and of Carlyle, to whom he was for many years a next-door neighbor in Cheyne Row Consult *Memoir of Alexander Gilchrist*, prefixed to the second edition of the *Life of Blake* (London, 1880)

GILCHRIST, WILLIAM WALLACE (1846–1916) An American organist, choral conductor, and composer, born in Jersey City, N J He studied music under Professor Clarke at the University of Pennsylvania and afterward took up the profession of teaching, in which he was eminently successful From 1873 to 1877 he was choirmaster of St Clement's Church, Philadelphia, from which he went to Christ's Church, Germantown, as organist and choirmaster In 1882 he joined the faculty of the Philadelphia Musical Academy and in the same year won the prize in composition at the Cincinnati Musical Festival with his *Psalm XLVI*, written for solos, chorus, orchestra, and organ Two years before he had won the Mendelssohn Glee Club (New York) prize, with the composition *Autumn Dreaming* He was conductor of several important Eastern choral societies, and his compositions, particularly for the Church, are very widely known Other important compositions are *Song of Thanksgiving*, arranged for chorus and orchestra, a cantata, *The Rose* (1887), the *Ode to the Sun*, two symphonies in D and C, and some chamber music

GILDAS, gĭl'das, or **GILDUS,** gĭl'dŭs (?–570) A British historian, known as St Gildas the Wise According to Mommsen, he was born at the end of the fifth or at the beginning of the sixth century, certainly before 504 He spent the last years of his life in Brittany His *De Excidio et Conquestu Britanniæ* was first printed in London in 1525 and has been often reprinted, both in England and on the Continent This work derives its value mainly from the lack of other sources for the period Gibbon has described Gildas in a single sentence "A monk who, in the profound ignorance of human life, has presumed to exercise the office of historian, strangely disfigures the state of Britain at the time of its separation from the Western Empire" His narrative extends from the invasion of Britain by the Romans to the author's own time The best edition of Gildas's work is by Mommsen, in the *Monumenta Germaniæ Historica, Auctores Antiquissimi*, vol xiii (Berlin, 1898) The introduction is excellent For other editions and for secondary works, consult Molinier, *Les sources de l'histoire de France*, vol i (Paris, 1902) See NENNIUS

GILDED AGE, THE A story by Mark Twain and Charles Dudley Warner (1873), satirizing politics and society It introduces the typical character of Col Mulberry Sellers

GILDEMEISTER, gĭl'de-mī'stēr, JOHANN (1812–90) A German Orientalist, born at Klein-Siemen (Mecklenburg) He studied at Gottingen and Bonn, in 1839 he became lecturer in Oriental languages and literatures at Bonn, and in 1844 professor there From 1845 to 1859 he was at Marburg as professor of theology and Oriental literature and in the latter year accepted the chair of Oriental languages at Bonn His publications include *Sexti Sententiæ* (1874), *Esdræ Liber Quartus Arabice* (1877), *Idrisii Palæstina et Syria Arabica* (1885), and an edition of the *Meghaduta and Srŭgāratilaka* (1840) of Kalidasa He was one of the founders of the German Oriental Society

GILDEMEISTER, OTTO (1823–1902) A German journalist and translator, born in Bremen From 1850 to about the time of his death he was editor in chief of the *Weser-Zeitung* of Bremen He is known for his German renderings of Byron's complete works (1864–65, 5th ed, 1904), of a number of plays of Shakespeare, including the historical ones, for the Bodenstedt edition, of Shakespeare's *Sonnets* (1871), Ariosto's *Orlando Furioso* (4 vols, 1882), Dante's *Divina Commedia* (1888, 3d ed, 1900).

GILDER, gĭl′dĕr, JEANNETTE LEONARD (1849–1916). An American journalist and critic, born at Flushing, N Y She was connected from 1869 with various newspapers in Newark and New York, was associated with her brother, Richard Watson Gilder, in the editorship of *Scribner's Monthly*, now the *Century*, and was joint editor with her brother, Joseph B Gilder, of the *Critic* from 1881 to 1906, when that magazine ceased publication, and she became associated with *Putnam's Magazine*, a periodical taking the name of its predecessor of an earlier generation, of which during its short life Joseph B Gilder was editor Her publications include *Representative Poems by Living Persons* (1886), *Pen Portraits of Literary Women* (1887), *Essays from the Critic* (1882), *Authors at Home* (1889), *The Autobiography of a Tomboy* (1900), *The Tomboy at Work* (1904) In 1909 she began to edit *The Reader*, a guide for book buyers, of which she was the proprietor

GILDER, JOSEPH BENSON (1858–) An American editor, brother of Richard Watson and Jeannette L. Gilder (qq v) He was born at Flushing, N Y, studied two years in the United States Naval Academy, and for some time was engaged in newspaper work in Newark, N J, and New York City In 1881, with his sister, he founded *The Critic*, later *Putnam's Magazine*, of which he was coeditor for many years He was literary adviser to the Century Company (1895–1902), helped organize the University Settlement Society of New York, in 1902–04 was United States dispatch agent at London, and in 1910–11 was editor of the New York *Times* "Review of Books" He edited James Russell Lowell's *Impressions of Spain* (1899), Andrew Carnegie's *Gospel of Wealth* (1900), *The American Idea* (1902), *Addresses of John Hay* (1906), and with his sister, *Essays from the Critic* (1882) and *Authors at Home* (1889)

GILDER, RICHARD WATSON (1844–1909) An American poet and editor He was born in Bordentown, N J, Feb 8 1844, the son of the Rev William Henry Gilder, at whose seminary in Flushing, L I, he was educated During the Civil War, while a student of law in Philadelphia, he served as a private in Landis's Battery at the time of the invasion of Pennsylvania After some experience in editorial work he, with Newton Crane, founded the Newark *Register* and later was editor of *Hours at Home* and afterward assistant editor of *Scribner's Monthly*, into which the former was merged In 1881 he succeeded Dr Holland as editor in chief of the latter under its new name of the *Century*, a position which he held up to the time of his death Mr Gilder took an active interest in all public affairs, especially those which tend towards reform and good government, and was a member of many New York clubs He was one of the founders of the Society of American Artists, of the Authors' Club, and of the International Copyright League, also chairman of the New York Tenement House Commission of 1894 He was first president of the New York Kindergarten Association, vice president and acting president of the City Club of New York; president of the Public Art League of the United States, a member of council of the National Civil Service Reform League, a founder of the Anti-Spoils League, and a member of the American Institute of Arts and Letters His work includes *The New Day* (1875), *The Celestial Passion, Lyrics, Two Worlds, The Great Remembrance* (these in one volume), *Five Books of Song* (1894), *For the Country* (a selection, 1897), *In Palestine, and Other Poems* (1898), *Poems and Inscriptions* (1901), *In the Heights* (1905), and, a collection, *A Book of Music* (1906)

GILDER, WILLIAM HENRY (1838–1900) An American Arctic explorer, born in Philadelphia, Pa At the beginning of the Civil War he enlisted in the Fifth New York Infantry (Duryea's Zouaves), was transferred to the Fortieth, and was mustered out with the rank of captain and brevet major In 1871–77 he was managing editor of the Newark *Register* and in 1878–80 was second in command on the expedition of Lieutenant Schwatka in search of the relics of Sir John Franklin He accompanied the De Long expedition on the *Rodgers* under Captain Berry and, after the burning of the vessel on the western shore of Bering Strait, made a midwinter journey of nearly 2000 miles across Siberia to telegraph to the government the news of the disaster He afterward participated in the search for De Long in the Lena Delta In 1883 he was in Tongking as a war correspondent during the French-Anamese War and in 1884 visited the region of the earthquakes in Spain On his expeditions and travels he was a correspondent of the New York *Herald* He published *Schwatka's Search Sledging in the Arctic in Quest of the Franklin Records* (1881) and *Ice-Pack and Tundra* (1883)

GILDEROY, gĭl′dĕr-oi The romantic hero of a ballad preserved in Percy's *Reliques*, and a veritable character, Patrick of the Clan Gregor, in the annals of Perthshire, who was hanged as a highwayman, with five of his companions, in 1638 It was his boast that he had picked Cardinal Richelieu's pocket, robbed Cromwell, and hanged a judge

GILDERSLEEVE, gĭl′dĕr-slēv, BASIL LANNEAU (1831–1924) A distinguished American classical scholar, born at Charleston, S C He graduated from Princeton in 1849 and then studied in Germany at the universities of Berlin, Bonn, and Gottingen, receiving the degree of Ph D from Gottingen in 1853 Upon his return to the United States he was professor of Greek in the University of Virginia from 1856 to 1876, he was also professor of Latin in 1861–66 In 1876 he became professor of Greek at Johns Hopkins University, then newly founded He undertook, in addition, the editorship of the *American Journal of Philology*, upon its establishment in 1880, and by his own writings in this journal and in the *Transactions of the American Philological Association*, as well as in his edition of Justin Martyr (New York, 1877), he made most valuable contributions to the syntax of Greek and Latin and to the history of Greek literature. On his seventieth birthday 44 of his former pupils, most of them professors in American universities, published in his honor a collection of their papers, entitled *Studies in Honor of Basil L Gildersleeve*, an octavo volume of more than 500 pages (Baltimore, 1902) He published numerous works *A Latin Grammar* (1867, 1894, 1899), a valuable edition of Persius (1875), an edition of Pindar, famous for its introduction (1885), *Essays and Studies Educational and Literary* (1890), *Hellas and Hesperia* (1909) Of very great importance is his *Syntax of Classical Greek from Homer to Demosthenes*, in collaboration with C. W. E Miller (New York, part 1,

1900, part ii, 1911) He was elected president of the American Philological Association in 1877 and again in 1908 and became a member of the American Academy of Arts and Letters as well as of various foreign learned societies He received the degree of LL D from William and Mary (1869), Harvard (1896), Yale (1901), Chicago (1901), and Pennsylvania (1911), D C L from the University of the South (1884), L H D. from Yale (1891) and Princeton (1899), Litt D from Oxford and Cambridge (1905).

GILDERSLEEVE, VIRGINIA CROCHERON (1877–) An American educator She was born in New York City, attended the Brearly (preparatory) School, graduated from Barnard College (Columbia University) in 1899, and obtained her doctor's degree in 1908 She was assistant in English (1900–03), tutor (1903–05), instructor (1905–07), lecturer (1908–10), assistant professor (1910–11), and professor of English and dean (after 1911) of Barnard College She became a member of various learned societies She is author of *Government Regulation of the Elizabethan Drama* (1908).

GILDER'S WHITE See CHALK

GILD'ING (from *gild*, AS *guldan*, from *gold*) The art of covering a surface with a thin layer of gold There are many processes of gilding, varying with the nature of the substance to be gilded and the kind of effect desired The different methods, however, may be grouped under the three general classes of mechanical gilding, chemical gilding, and encaustic gilding

Mechanical Gilding consists of applying gold leaf directly to a surface which has been previously prepared by the application of a size The gold leaf, being placed on the size while it is only partially dry, adheres Various forms of gold leaf, and various substitutes as well, are used for gilding. There is the genuine deep or reddish gold, pale gold, the paleness being due to a silver alloy, silver leaf, afterward colored or varnished to imitate gold, and "Dutch" leaf, a copper alloy having an appearance similar to gold. The gilding material is sold in "books," a gold book usually containing 24 leaves, 3 inches square Several different sizes are also used, of which the commonest are "old gold size," a mixture of litharge, linseed oil, and ochre, and "water size," made by dissolving isinglass in boiling water, and adding an equal volume of spirits, and then straining the mixture through silk Gilding may be applied in this manner to wood, cardboard or paper, textiles, metals, masonry, or ivory When applied to cards, papers, or textiles, the surface must be rendered nonabsorbent by a preliminary sizing of weak glue before the regular gilding size is applied Before gilding a metal surface it must be painted, to protect the surface from oxidation and decay Metals, however, are rarely gilded by the mechanical process. Masonry, before being gilded, must be "satisfied"—i e, its porous surface must be rendered waterproof by a solution of shellac and gutta-percha, in naphtha or some other equally efficacious coating. In gilding ivory a warm size is applied. Plaster of Paris needs several preliminary coats of boiled linseed oil before the gold size is applied. The object of the preparatory treatment of all surfaces is, of course, to secure a smooth, impenetrable, and permanent surface on which to lay the gold leaf. The leaf is accurately cut the desired shape and applied to the sized surface by means of special tools After being carefully brushed, to remove stray fragments, the gilding is given a final coat of specially prepared varnish Glass is gilded by a special process The gold sheet is made to adhere to the *back* of the glass simply by moistening it with the breath, the glass having been previously cleaned by a preparation of whiting, rubbed off with silk. The pattern is marked in reverse on the back, and that part of the gold inclosed in the pattern fixed by a coat of Brunswick black or other size After this has thoroughly dried, the portions not included in the pattern are carefully rubbed off with wet cotton Where gilt ornaments are to be put on a japanned ground, they are by one method painted with gold size, and gold leaf afterward applied By another way rather more than the space the ornament is to occupy is wholly covered with gold leaf, adhering with isinglass The ornament is then painted on with asphaltum, which protects the gold beneath it while the superfluous leaf is being washed away A little turpentine will then remove the protecting asphaltum so as to display the gilt ornament

GILDUS. See GILDAS

GILEAD, gil'ē-ad (Heb *Gil'ād*, connected with Ar *jal'ad*, hard, rough) A mountainous district on the east side of the Jordan, whose boundaries are variously conceived in different portions of the Old Testament In general, it includes the whole mountain region between the Yarmuk on the north and the Arnon on the south, the eastern boundaries being formed by the desert table lands of Arabia (the plains of Bashan), and the western by the Jordan In spite of its name, Gilead is a beautiful and fruitful region The vegetation is luxuriant, especially in the central part round the brook Jabbok, where forests of oak and terebinth occur. Gilead, in fact, is better provided with water and woodland than any part of western Palestine. It formerly produced gums and spices The hills are not very high, and they have broad summits almost like table lands The district is well adapted for pasturage (Num xxxii 1) Gilead was much exposed to Bedouin raids from the east and other hostile attacks, and its history has much to do with wars The land was conquered from Sihon and Og and handed over to Reuben, Gad, and the half tribe of Manasseh (Num xxi 21–26, Deut iii 16) These tribes held it against the Midianites (Judg viii), Ammonites (Judg xi. 32, xii 3), and Syrians (2 Kings ix 14), but finally lost it to the Assyrians Tiglath-pileser captured the land and carried the inhabitants captives (1 Chron v 26) Gilead is also interesting as forming a refuge to which Absalom fled (2 Sam xiii 38) when fearing the anger of his father, while subsequently, during the rebellion of Absalom, David found an asylum there (2 Sam xvii 27–29) It was in Gilead, likewise, that Ishbosheth, the son of Saul, was proclaimed King by Abner (2 Sam. ii 8–9) The valiant men of Jabesh-Gilead performed the last rites for the bodies of Saul and his sons after the battle of Mount Gilboa (1 Sam. xxxi 11–13) Elijah sojourned there (1 Kings xvii 1), and Jesus made visits to this region In the wars of the Maccabees Gilead played an important part, and under Roman occupation its natural resources were greatly developed Among the principal cities were Mahanaim, Succoth, Penuel, Mizpeh, and

Jazer, in latter times Pella and Gerasa A conspicuous mountain (perhaps the Jebel Osha) was known as the mountain of Gilead (Gen xxxi 21 et seq) Consult Oliphant, *The Land of Gilead* (London, 1880), and Merrill *East of the Jordan* (New York, 1881)

GILES, jīlz, HENRY (1809–82) An Irish-American clergyman, lecturer, and essayist He was born in County Wexford, Ireland, and was educated in the Roman Catholic faith at the Royal Academy at Belfast, but he afterward joined the Unitarian church and held pastorates at Greenock and Liverpool In 1840 he came to the United States, where he soon became known as a lecturer and essayist of considerable force and originality He published *Lectures and Essays* (1845), *Christian Thought on Life* (1850), *Illustrations of Genius in Some of its Relations to Society and Culture* (1854), *Human Life in Shakespeare* (1868, revised, 1887), *Letters and Essays on Irish and Other Subjects* (1869)

GILES, HERBERT ALLEN (1845–) An English Orientalist, educated at the Charterhouse He entered the China consular service in 1867, was Vice Consul at Pagoda Island (1880–83) and Shanghai (1883–85) and Consul at Tamsui (1885–91) and Ningpo (1891–93), and was professor of Chinese at Cambridge and (in 1902) first lecturer at Columbia University on the Lung Foundation Among his writings were *Chinese without a Teacher* (1872, 6th ed, 1908), *Chinese Sketches* (1876), *Handbook of the Swatow Dialect* (1877), *Glossary of Reference* (1878, 3d ed, 1900), *Historic China* (1882), *The Remains of Lao Tzu* (1886), *Chinese-English Dictionary* (1892, 2d ed, 1912) and *Chinese Biographical Dictionary* (1897), which received the Prix St Julien of the French Academy, *Chinese Poetry in English Verse* (1898), *History of Chinese Literature* (1901); *China and the Chinese* (1902), Introduction to the *History of Chinese Art* (1905), *Chinese Fairy Tales* (1911), *The Civilization of China* (1911), *Adversaria Sinica* (1906–13), *China and the Manchus* (1912)

GILES, PETER (c 1860–) An English philologist, educated at Aberdeen University, at Gonville and Caius College, Cambridge, and at Freiburg At Cambridge he became fellow of Gonville and Caius in 1887, fellow and classical lecturer of Emmanuel in 1890, university reader in comparative philology in 1891, and master of Emmanuel in 1911 He published an excellent *Short Manual of Comparative Philology* (1895), and wrote, especially on Greek linguistics, for philological journals, etc

GILES, jīlz, SAINT (Gk Αἰγίδιος, Αἰγιδιος, Lat *Ægidius*) A hermit of France and abbot of a Benedictine monastery in the second half of the seventh century He is said to have been an Athenian of royal descent, from early years distinguished for piety and charity Annoyed by the publicity to which his reputation as a holy man exposed him at home, he went to Provence about 665 and took up the hermit life in a solitary spot near the mouth of the Rhône, living upon herbs and the milk of a hind which came to his cell at stated hours Here he was discovered by the King of the Goths, who while hunting followed the hind to the hermit's cave Reluctantly Ægidius consented that a monastery should be established at the place He became its first abbot and held the office till his death. Consult Rembry, *Saint Gilles* (Bruges, 1881).

GILES, WILLIAM BRANCH (1762–1830) An American politician and legislator He was born in Amelia Co, Va, was educated at Hampden-Sidney and Princeton (1781), studied law with Chancellor George Wythe, and practiced law for several years in Petersburg, Va In early life he was a Federalist in politics, but association with Jefferson's followers in his native State caused him to change his views, and he was elected to Congress in 1790 as a Republican During his career in the House, which lasted until 1803, with the exception of the session of 1799–1801, he was leader of the extreme Republicans, with Edward Livingstone, Nathaniel Macon, Andrew Jackson, and a few others, he voted against the adoption, after Washington's last message, of a complimentary vote approving his policies In 1791 he actively opposed the proposition for the establishment of the United States Bank In January, 1793, he accused Hamilton, then Secretary of the Treasury, of corruption, and when Hamilton vindicated his acts, Giles pressed resolutions of censure, which the House refused to adopt In 1795 he led the opposition to the Jay Treaty (q v.) In 1798 he was an earnest advocate of the principles of the Virginia Resolutions, joining with Madison, Taylor, and Wilson Cary Nicholas in securing their adoption From 1799 to 1801 he served in the Legislature of Virginia He used the most bitter invectives in his debates, declared that the nation was being undermined by monarchical tendencies, and openly charged the Federalist leaders with being in the pay of Great Britain The Federalists detested him thoroughly He succeeded Wilson Cary Nicholas in the United States Senate in 1804 and became at once the leading spokesman of his party He was one of the leaders in the impeachment of Justice Chase (see CHASE, SAMUEL), but voted for his acquittal on a majority of the charges, causing a breach which was never healed between himself and John Randolph, the principal manager of the impeachment trial on the part of the House On the collapse of the Burr conspiracy in 1807, Giles introduced a bill for the suspension of the writ of habeas corpus, and secured its passage in the Senate, but it was defeated, through the influence of Randolph, in the House Another bill introduced by him, which defined treason and provided severe penalties, was superseded in the House by a milder bill of Randolph's In December, 1808, he introduced his bill for the strict enforcement of the embargo, which was intended by the severity of its provisions to break down the embargo entirely From 1809 to 1815 Giles was active in the factional fights within his party, and, with Samuel Smith and Vice President George Clinton, formed the cabal that eventually drove Gallatin from the cabinet, hampered the Madison administration by forcing upon it Robert Smith as Secretary of State, and by opposing its war policy and aiding the Federalists almost disrupted the Union itself Nevertheless, he was made chairman of the Senate Committee on Foreign Relations in 1811, in which position he was able to force upon Madison several military measures Being absolutely discredited as a party leader and distrusted by his colleagues, he resigned his seat in the Senate in 1815 He lived in retirement until 1825, when he was an unsuccessful candidate for the Senate against John Randolph In 1827 he became Governor of Virginia, an

office which he held until shortly before his death

GILES LAND See GILLIS LAND

GILFIL, gil'fil, REV MAYNARD The hero of George Eliot's *Mr Gilfil's Love-Story*

GILFILLAN, gil-fil'lan, GEORGE (1813–78) A Scottish critic and essayist He was born at Comrie, a village in Perthshire, Jan 30, 1813 Educated at the University of Glasgow and at the Divinity Hall of the Secession Body (afterward the United Presbyterian church), he was ordained, in 1836, to the School Wynd Church, Dundee, where he remained till his death, Aug 13, 1878 His works, in which he displayed wide literary sympathies, are numerous Among them are *A Gallery of Literary Portraits* (3 series, 1845, 1850, 1854), *The Bards of the Bible* (1850) *The Martyrs of the Covenant* (1852), *History of a Man*, in part autobiographical (1851), *Night A Poem* (1867), lives of Scott (1870) and of Burns (1879), and an edition of the *British Poets* (1853–60) He did much to promote popular education and was a successful lecturer His *Literary Portraits* were reprinted in 1909

GILGAL, gil'găl (Heb, circle, referring to the circle of stones marking a sacred spot) The name of an ancient city in the Jordan valley between Jericho and the river According to Josh. iv, it was here that the Israelites first encamped after crossing the Jordan, and this place is represented as their headquarters during the war for possession of Canaan Here the 12 stones from the Jordan are said to have been erected, and all Israel was circumcised in this sacred spot It occurs frequently in the history of Samuel and Saul Its importance as a sanctuary is evident from the fact that Saul was made King of Israel there, and that it is often mentioned by Hosea, Amos, and Micah. It is doubtful whether the same Gilgal is meant in the story of Elijah and Elisha (2 Kings ii 1, iv. 38), the name is of such a character that it may well be supposed that many places were thus designated, but no convincing evidence has been produced to show that the Gilgal of the Jordan valley is not intended. In Josh xii. 23 the original reading does not seem to have been Gilgal, but Galil as the Greek version indicates Gilgal is represented to-day by a mound called Tell Jeljul, near Jericho. Consult Guthe, in *Bibelwörterbuch* (Tubingen, 1903)

GILGAMESH, gil'ga-mĕsh The name of the hero in a Babylonian epic, large portions of which have now been found among the cuneiform tablets constituting the "brick" library of King Asurbanipal At first the name of the hero, written ideographically, was provisionally read Izdubar (or Gishdubar), which simply represented the sound of the three signs *iz* (or *gish*), *du*, and *bar*, with which the name was written The phonetic reading "Gilgamesh" was discovered by T G Pinches in 1890 The Gilgamesh epic consisted originally of 12 tablets and comprised about 3000 lines About half of it has been recovered. The epic is a composite production, many of the stories told about Gilgamesh being attached to him merely because he became the favorite hero of the Babylonians, whose adventures acquired great popularity. In the Gilgamesh epic dimmed historical traditions and pure myth are represented in about equal proportions He is a deified hero As a hero, he is primarily associated with the South Babylonian city Uruk (modern Warka), which he conquers, as a god, he is a solar deity who is introduced in incantations and hymns Gilgamesh is a hero of irresistible strength and among his adventures is a fight against a tyrant, Khumbaba, who is represented as dwelling in a fortress situated in a grove of wonderful grandeur This adventure probably recalls some historical event, but in the sixth tablet a mythical element is introduced Ishtar, the goddess of fertility, has become enamored of Gilgamesh and offers herself to the hero, who, however, refuses her and adds insult to injury by reprimanding the goddess for her cruelty to her former lovers As a punishment, a mighty bull is sent out by Anu, the god of heaven, to kill Gilgamesh, but the latter successfully vanquishes the bull Thereupon Gilgamesh is smitten with disease and begins a long series of wanderings in search of healing This disease represents the decline of the year, when the sun (Gilgamesh), removing itself from the earth (Ishtar), is imagined to be deprived of its former strength Associated with Gilgamesh is another hero, Engidu, of whom, likewise, stories were current, some of which were transferred to Gilgamesh Engidu and Gilgamesh become associates, and the former is also punished by Ishtar and eventually dies, whereas Gilgamesh ultimately finds a remedy that at least partially restores him In the course of his wanderings he has many adventures He passes through dangerous regions, encounters scorpion men and lions before he reaches an ancestor, Ut-napishtim, who has survived a destructive deluge, and from whom Gilgamesh hopes to learn the secret of eternal life and also to obtain healing from disease When he at last encounters Ut-napishtim, the latter tells him the story of the deluge (q v), and while Gilgamesh does not learn the secret of immortality, he is healed of his disease and returns to Uruk

It was formerly supposed that Gilgamesh was the counterpart of the biblical Nimrod, but this theory has now been abandoned Gilgamesh bears a certain relationship to Samson, and phases of the Gilgamesh epic are thought by Jensen and others to have passed on to the Greeks and to have been embodied in the Hercules epic Again, in the legends which cluster in the Orient around Alexander the Great, certain elements have been introduced which can be traced back ultimately to the Babylonian tales of Gilgamesh Consult Haupt, *Das babylonische Nimrodepos* (Leipzig, 1884–92), *Jeremias, Izdubar-Nimrod* (ib, 1891), Jensen, *Keilinschriftliche Bibliothek*, vi, 1 (Berlin, 1900). id, *Das Gilgameschepos* (Leipzig, 1906), Ungnad, in Gressmann, *Altorientalische Texte und Bilder* (Tubingen, 1909), Rogers, *Cuneiform Parallels to the Old Testament* (New York, 1912), Jastrow, *Religion Babyloniens und Assyriens* (Tubingen, 1902–12), id, *Babylonian and Hebrew Traditions* (New York, 1914)

GILIA (Neo-Lat, named in honor of Felipe *Gil*, a Spanish botanist) A genus of about 70 species of annual or biennial and a few perennial herbs (mostly western) of the family Polemoniaceæ The species have small, many-colored, funnel-shaped or bell-shaped or sometimes salver-shaped five-lobed corollas, and some of the species have become popular in gardens, for which purpose they are well adapted, since they are hardy, prolific of bloom, sturdy, and of simplest culture The seed is sown in any good soil, usually where the plants are to remain.

Gilia tricolor is shown on Plate of CALIFORNIA FLORA

GILIAKS, gĭl'ĭ-ăks A people of the northern portion of the island of Saghalien, and the coast and lowlands about the mouth of the Amur and Liman They number some 4500 and are divided into three tribes, with at least two chief dialects Physically they seem to be a mixed people—one type found among them resembling more the Aino, the other the Tungus, but generally they are brachycephalic, of average height, and well built Their marriage regulations and their bear festivals are of great interest The Giliaks, who are a hunting and fishing folk, have been influenced in their house-building and domestic arrangements by the Russians and in the ornamentation by the Chinese Brinton (1890) classes them with the Tchuktchis, Koriaks, Kamchatkans, etc , but Steinberg, who lived several years in this part of Asia, and Laufer incline to place them as a people apart from all others, in respect of language in particular Some include them in the so-called "Paleo-Asiatics" The Giliaks possess a canoe of the monitor form, which resembles that of the Kootenay Indians of British Columbia The Amur and the Kootenay rivers are the only regions of the globe where this type is found Besides the article of Deniker on the Giliaks in the *Revue d'Ethnographie* (Paris), for 1884, the literature about them embraces Schrenck, "Die Volker des Amurlandes,' vol iii of his *Reisen und Forschungen in Amurland, 1854–56* (St Petersburg, 1881–91), Laufer, "Explorations among the Amoor Tribes," in *American Anthropologist* (New York, 1900), and the researches of Sternberg, continued by Weinstein in the *Verhandlungen der Berliner Gesellschaft fur Anthropologie* for 1901.

GILIMER See GELIMER

GILL, gĭl, or **BRANCHIA,** brăn'kĭ-a (from Dan *gjælle*, gill, Icel *gjöllnar*, gills; connected with Icel *gil*, Eng *gill*, ravine) One of the special respiratory paired organs of animals which breathe oxygen dissolved in water The lowest animals respire directly through the thin body wall at all parts of the surface and consequently require no special respiratory organs In the higher animals, such as the mollusks, the body has become of great size and has a thick skin for protection, and the skin is often covered by a secreted cuticula or a shell Under these circumstances oxygen cannot be taken in at all parts of the body, and there must be special organs for respiration, the essential feature of which is that they shall have a delicate, permeable wall The gills are such organs The gills are, almost without exception, outgrowths of the body wall, provided with a thin wall and bathed by water. They contain blood spaces, or blood vessels, which carry the oxygen from the gills to the tissues and probably carry carbonic acid back to the gills to be excreted there All gills, therefore, are physiologically alike, but they are not all homologous We cannot consequently describe them all from one point of view, but shall have to consider them by classes Gills have arisen independently in at least four different phyla, and even inside a single phylum the gills are by no means all related. We shall consider in order the gills of worms, mollusks, echinoderms, annelids, arthropods, and chordates

Worms, Brachiopods, etc The flatworms, roundworms, and rotifers respire over the whole surface of the body, but in the Polyzoa and Brachiopoda, in which the body is more or less incased in a shell, the tentacles, taken together, form a respiratory organ and may be spoken of collectively as gills The tentacles are thin-walled and hollow, and their cavities communicate with the general body cavity, so that the body lymph may carry oxygen from the gills to the tissues

Mollusks These massive animals have to solve a much harder problem in respiration than have the Scolecida In the lamellibranchiate the foot is surrounded by a double row of tentacles These remain as distinct straight filaments in a few genera, such as *Nucula*, *Leda* *Yoldia*, and *Solenomya*, but each filament is reflected, making a knee bend, so that each series of filaments, or "gills," is double, as in *Anomia*, *Arca*, and the mussels (Mytilidæ) The reflected part of each filament may be united with the basal part, and the free end of the reflected filament may grow fast to the body or to the mantle In the other lamellibranchs the adjacent filaments are united by crossbars, forming a sort of network Each filament and connecting bar is hollow blood courses through it and receives oxygen from the water that rushes by it on all sides The mechanism for bringing the water to the gills is simple—water rushes into the mantle chamber, bathing the gills and penetrating between the filaments as it goes in and out In the shelled gastropods there is a pair of gills on the right and left of the neck in a few symmetrical species, but in most of the spirally coiled species there is only one gill, and that is on the left side The gill consists of a finger-like process containing a vessel carrying blood to the tip of the gill and one carrying it from the gill In passing from the first to the second vessel the blood is spread out over numerous thin-walled plates, where it comes in contact with the water In the naked gastropods respiration occurs chiefly on the whole surface of the body, but sometimes by special finger-like outgrowths In cephalopods there are either two or four gills, which lie in the mantle cavity, projecting forward, and are fastened on both sides The general arrangement is the same as in the gastropod gill, but the capillary absorbing surfaces are much increased in area

Echinoderms The respiratory organs in the group of echinoderms are not all homologous, for the most part they have the function, as it were, by accident In the starfishes parts of the outer skin are raised up to form thin-walled papillæ, which are believed to be respiratory In the serpent stars the thin-walled pouches lying next the arms in which the sexual products are thrown serve also for respiration In the sea urchins there is a gill at the base of each interradius on the outer edge of the thin membrane about the mouth The gill is merely a thin-walled sac of the skin, into which the body fluids can flow In the sea cucumbers (Holothuroidea) there are special, complicated respiratory organs called the respiratory trees They arise from the lower end of the food canal, as great branched sacs extending up into the body cavity Water flows into these "trees" and out of them at regular intervals The "trees" are wanting in a few thin-walled sea cucumbers, such as *Synapta* and a pelagic and a deep-sea form

Annelids and Arthropods. The thick-skinned fresh-water annelids need no gills, but

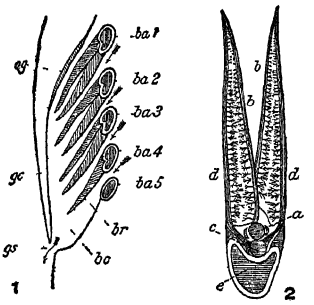
the thick-skinned marine ones have usually some special provision for respiration The swimming feet often have a thin, broad lobe containing blood vessels, and in a few annelids there are special filiform or branched outgrowths of the feet, which aid in respiration Since the Crustacea are thick-skinned, nearly all of them have gills In the Lower Crustacea there are respiratory plates (podobranchiæ) attached to the legs, but in the higher forms these leg organs form pyramidal masses with central efferent and afferent vessels leading to and from the hundreds of delicate papillæ of which the gill is composed The gills are so placed that the blood leaving them goes directly to the heart. The great gills are covered by a special shield, the carapace

In the merostomes (king crabs, etc), the gills are broad, flat, and rounded sacs, like the leaves of a book, forming a file of upward of 100 on each of the gill-bearing abdominal legs In the trilobites the gills form triangular expansions of certain of the segments of many of the legs behind the head

Insects The gills of insects whose nymphs or larvæ are aquatic are called "tracheal" gills, because they are permeated by fine air tubes, they are long or flattened leaflike filaments attached to the sides or end of the body Such are the gills of the larvæ of the caddis flies, and of certain aquatic caterpillars (*Paraponyx*), those of the nymphs of May flies are broad and leaflike In the highly modified nymphs of certain May flies (*Bætisca* and *Prosopistoma*), the dense masses of tracheal gills are entirely concealed and protected by projections of the mesothoracic segment, so as to form a true respiratory chamber, to which the water gains access by minute openings. Blood gills are described by Fritz Muller as certain delicate and tubular processes, into which the blood flows, and which do not contain tracheæ Muller compares them with the gills of Crustacea, they occur in case worms The larva of *Pelotrus*, a beetle, has true blood gills A few adult insects (*Pteronarcys*, and other Perlidæ) have tracheal gills arising in tufts on the underside of the thorax. In a dragon fly (*Euphœa*) the gills of the nymph are retained in the imago The nymphs of many dragon flies breathe by rectal gills. Consult Packard, *Text-Book of Entomology* (New York, 1898).

Chordata Gills in this group are at least roughly homologous In all the lower aquatic forms water is taken into the mouth and forced out through slits in the neck The sides of these slits, when the current is strongest, are beset with filaments in which the blood circulates and receives oxygen The gills may be covered, as in most fishes, or they may stand out from the sides of the body, as is the case in gilled Amphibia The latter position is a precarious one, for the gills are often bitten off, but they can be quickly regenerated. See ALIMENTARY SYSTEM, EVOLUTION OF THE; RESPIRATORY SYSTEM, COMPARATIVE ANATOMY OF THE

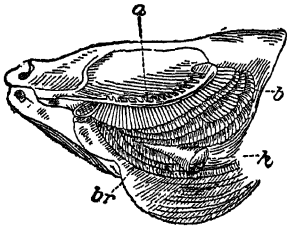
Fishes The lampreys, myxinoids, sharks, and rays are termed fishes with "fixed gills," because in them each supporting septum of the anterior and posterior branchial mucous surfaces is attached to the pharyngeal and dermal integument by its entire outer margin, and the streams of water flow out by the same number of fissures in the skin as those by which they enter from the pharynx In the osseous and in the ganoid fishes there are "free gills," the outer border of the supporting branchial arch being unattached to the skin and playing freely backward and forward, with its gill surfaces, in a common gill cavity, which has a single outlet, usually in the form of a vertical fissure In the



ARRANGEMENT OF A FISH'S GILLS

Fig 1 Diagram to show the arrangement of the gills in a bony fish, as seen in a horizontal section of the branchial chamber on one side *gc*, gill cover, *gs*, gill slit, *bc*, common branchial chamber, *ba* 1 to *ba* 4 first four gill-bearing branchial arches, the first three having a double series of branchial laminæ, the fourth having only a single series, *ba* 5, rudimentary fifth branchial arch ("inferior pharyngeal" bone), which carries no gills, *og*, pseudobranchia or "opercular gill," developed on the inner face of the gill cover The arrows show the passage of the water through the branchial fissures and out by the gill slit Fig 2 Diagram of a pair of branchial laminæ in a bony fish *e*, branchial arch transversely divided, showing the external groove in which the great vessels run, *a*, branchial artery, giving off branches (*bb*) along the inner edges of the branchial laminæ, *c*, branchial vein, receiving branches (*dd*) from the outer edges of the branchial laminæ

myxinoids (see illustration under HAGFISH) six or seven branchial sacs open on each side, and their outlets are produced into short tubes, which open into a longitudinal canal, directed backward and discharging its contents by an orifice near the middle line of the ventral surface. Between the two outlets is a third larger one, which communicates by a short duct with the end of the œsophagus and admits the water, which passes from that tube by the lateral orifices leading into the branchial sacs These sacs, which are developed from the œsophagus, and which may be regarded as the simplest form of piscine gill, have a highly vascular, but not a ciliated, mucous membrane, which is arranged in radiating primary and secondary folds, so as to increase the surface In the lampreys there is a further separation of the respiratory from the digestive tract, for each internal blind duct communicates with a median canal beneath and distinct from the œsophagus.



GILLS OF A PERCH

Gills and heart of the perch, exposed by the removal of the gill cover on the left side *a*, first of the four bony arches which carry the gills (*b br*), *br*, lower edges of the gills on the right side, *h*, heart

In all the higher fishes the inlets to the branchial interspaces lie on each side of the gullet and are equal in number with the interspaces, while, except in the elasmobranchs, there is only one outlet on each side These outlets vary extremely in size, being relatively largest in the herring and

mackerel families, and smallest in the eels and lophiid fishes, as the angler (q v) The length of time that different fishes can exist out of water depends on the modifications for retaining water in the branchial chambers As a general rule, the chamber is largest where the outlet is smallest, as in the eels, blennies, and lophioids, and these are the fishes that survive the longest out of water, except in such cases as the climbing fish (q v), in which the branchial apparatus possesses complex labyrinthic appendages The main object of the gills of fishes being to expose the venous blood, in very thin-walled vessels, to streams of water, the branchial arteries rapidly subdivide into capillaries, which constitute a network in one layer, supported by an elastic plate, and covered by a tessellated but nonciliated epithelium This covering and the capillary wall are so thin as to admit free interchange to take place between the blood, loaded with carbonic acid, on the one hand, and the aerated water on the other The extent of respiratory surface is increased in various ways, of which by far the most common is "by the production of the capillary-supporting plates from each side of long, compressed, slender, pointed processes, extending, like the teeth of a comb, but in a double row, from the convex side of each branchial arch" The number of vascular plates or lamellæ attached to each branchial process has been estimated at 135 in the carp, 700 in the eel, 1000 in the cod, 1400 in the salmon, and 1600 in the sturgeon

Amphibia. We now pass on to the consideration of these organs in amphibians In the lower or perennibranchiate members of this order the gills exist permanently, but in the great majority they are mere temporary organs In the newt three pairs of external gills are developed, at first as simple filaments, each with a capillary loop, but speedily expanding and giving off loopletes The gill is covered with ciliated epithelium, which loses the cilia before the absorption of the organ, and this takes place after a few days of larval existence In the larval frog the gills, which are on a simpler plan, diminish about the fourth day and disappear on the seventh The parts of the branchial framework which support the deciduous gills never get beyond the cartilaginous stage. They thus readily shrink and become more internal as the head increases in size As the gills of the perennibranchiate amphibians in all essential points resemble those already described, it is unnecessary to notice them See AMPHIBIA, DIPNOI.

GILL, zhēl, ANDRÉ, pseudonym of LOUIS ALEXANDRE GOSSET DE GUINNES (1840–85) A French illustrator, born in Paris His first work appeared in *La Lune* and afterward appeared in *L'Eclipse* He excelled in the caricature of portraiture, and the best known of his drawings are the series of "Our Contemporaries" and "Our Deputies" He painted pictures that were shown at the Salon and wrote plays that were acted and verse that was often reprinted, but his great reputation was as a caricaturist of contemporary politics

GILL, gil, AUGUSTUS HERMAN (1864–) An American industrial chemist He was born at Canton, Mass, graduated from Massachusetts Institute of Technology in 1884, and received a Ph D from the University of Leipzig in 1890. At the former institution he was assistant in 1884–87, instructor in 1890–94, assistant professor of gas analysis from 1894 to 1906, associate professor of technical analysis in 1906–09, and professor after 1909 He lectured at Wellesley College in 1892–93 He was president of the New England section of the American Chemical Society in 1903 He is author of *Gas and Fuel Analysis for Engineers* (1896, 7th ed, 1913), *A Short Handbook of Oil Analysis* (1895, 7th ed, 1913), *Engineroom Chemistry* (1907, 2d ed, rev and enlarged, 1913)

GILL, gil, SIR DAVID (1843–1914) A Scottish astronomer, born in Aberdeenshire He studied at the University of Aberdeen and in 1873–76 was director of the private observatory of the Earl of Crawford (then Lord Lindsay) at Dunecht (Aberdeenshire), in which capacity he organized the transit of Venus expedition sent by Lord Lindsay to Mauritius In 1877 he organized and conducted an expedition to the Ascension island for the purpose of determining the solar parallax through observation of Mars For the results of this expedition he was awarded the gold medal of the Royal Astronomical Society, and the Valz prize at the Académie des Sciences of the Institut de France From 1879 to 1907 he was Royal Astronomer at the Cape of Good Hope In 1882–83 he carried out, with Elkin, an investigation of remarkable accuracy into the parallaxes of nine of the chief southern stars and in 1887 he undertook a second and equally important series of parallax observations In 1885–96 he executed the geodetic survey of Natal and Cape Colony and in 1897 organized the geodetic survey of Rhodesia His success in photographing the great comet of 1882 led him to urge the desirability of the use of photography in the preparation of catalogues of the stars, and in 1885 he began the "Cape Photographic Durchmusterung," by which the survey of the heavens carried out by Argelander in his "Bonn Durchmusterung" was extended to the south pole The publication of the results of this great survey of the southern heavens, which gives the positions of 454,875 stars, was completed in 1900 In that year he was made Watson gold medalist of the National Academy of Sciences, Washington, D C In 1903 he was awarded the royal medal of the Royal Society, and in 1908, for the second time, the gold medal of the Royal Astronomical Society He was president of the British Association in 1907–08 and of the Institute of Marine Engineers in 1910–11 His writings include memoirs on "Heliometer Determinations of Stellar Parallax in the Southern Hemisphere" and "A Determination of the Solar Parallax and Mass of the Moon from Heliometer Observations of Victoria and Sappho" (in *Annals of the Cape Observatory*, vols vi and vii, 1896) He also wrote *A Determination of the Solar Parallax from Observations of Mars at the Island of Ascension* (in the *Memoirs* of the Royal Astronomical Society, ib, vols xlvi and xlviii, 1881 and 1885) and *History and Description of the Royal Observatory, Cape of Good Hope* (1913)

GILL, JOHN (1697–1771) A Baptist minister, distinguished for his knowledge of rabbinic literature He was born at Kettering, Northamptonshire, Nov 23, 1697 He spent a short time at Kettering Grammar School, and continued his studies in private At an early age he began to preach, and was ordained in 1718 In 1719 he became pastor of a Baptist church at Horsleydown, in Southwark, in 1757 he removed to a new chapel in Camberwell, a London suburb, where he remained till his death,

Oct 14, 1771 Gill was a very voluminous author His greatest work was his *Exposition of the Holy Scriptures* (New Testament, 1746–48, Old Testament, 1748–63) He also wrote a *Dissertation on the Antiquity of the Hebrew Language, Letters, Vowel Points, and Accents* (1767), and many controversial works of merely temporary interest He was a strong Calvinist Consult his memoir by Ripon (London, 1816)

GILL, THEODORE NICOLAS (1837–1914). An American zoologist, born in New York City In 1865–67 he was librarian of the Smithsonian Institution, in 1866–75 assistant librarian of the Library of Congress, and in 1884 became professor of zoology in Columbian (now George Washington) University He was elected a member of the National Academy of Sciences, was appointed an associate in zoology in the United States National Museum, and in 1896 served as president of the American Association for the Advancement of Science His writings, chiefly on ichthyology, include *Synopsis of Fresh Water Fishes* (1861), *Arrangement of the Families of Mollusks* (1871), *Catalogue of the Fishes of the East Coast of North America* (1873, part i of the *Report* for 1871–72 of the United States Commission of Fish and Fisheries), *Bibliography of the Fishes of the Pacific Coast of the United States to the End of 1879* (1882), *Principles of Zoogeography* (1884), *The Characteristics of the Family of Scatophagoid Fishes* (1891); *Notes on the Tetradontoidea* (1892), *Parental Care among Fresh-Water Fishes* (1906) He also prepared with Elliott Coues *Material for a Bibliography of North American Mammals* (1877, in vol xi of Hayden, *Report of the United States Geological Survey of the Territories*)

GILL, WILLIAM JOHN (1843–81) An English military engineer and traveler, born at Bangalore, India. He studied at Brighton College and the Royal Military Academy (Woolwich), in 1864 was commissioned a second lieutenant in the Royal Engineers, and in 1869–71 served in India From 1871 to 1876 he was in England, on duty at Aldershot, Chatham, and Woolwich In 1874 he contested Hackney, and in 1880 Nottingham, both successfully His first experience as a traveler was had in 1873, when he accompanied Col Valentine Baker in a journey through Persia, during which he executed a survey contributing much to geography In 1876 he was transferred to Hongkong, and in 1876–78 traveled in China and Tibet This last journey is the one for which he is best known For the results of this journey, comprised principally in a large map and in a memoir published in the *Journal* of the Royal Geographical Society, he obtained the gold medal of that society (1879) and that of the Paris Geographical Society (1880) In 1879 he was appointed assistant boundary commissioner on the boundary between Russia and Turkey, newly established by the Berlin Treaty He was in Egypt in 1881 on special service, and having been sent to cut the telegraph wire which led from Cairo across the desert to Syria, was murdered by Bedouins at Wady Sahr He published *The River of Golden Sand* (2 vols, 1880, new ed, 1883), a popular account of his journey in Tibet and China

GILLE, zhēl, PHILIPPE EMILE FRANÇOIS (1831–1901). A French dramatist. He was born in Paris and at first studied sculpture, but in 1861 he became secretary of the Lyric Theatre He was on the staff of several Parisian journals, notably the *Figaro*, for which he began in 1869 to write the bibliographical criticisms Some of these have been collected under the title *La bataille littéraire* (4 vols, 1889–91) He also wrote a number of librettos and ballets and several comedies, such as *Vent du soir* (1857, music by Offenbach), *Le bœuf Apis* (1865, music by Delibes), *Les charbonniers* (1877), *Yedda*, a ballet (music by Métra), *Lakmé* (1883, for Delibes's music), *Manon*, the book of *Clarissa Harlowe* for Bizet, who died before completing the opera, and *Camille* (1890) He published a volume of poems, *L'herbier* (1887), and *Mémoires d'un journaliste* (5 vols, 1869–76) Gille married a daughter of the composer Massé

GILLEM, gĭl'lĕm, ALVAN CULLEM (1830–75) An American soldier, born in Jackson Co, Tenn In 1851 he graduated at the United States Military Academy, in 1851–52 served against the Seminole Indians, and during the Civil War was chief quartermaster of the Army of the Ohio in the Tennessee campaign, was appointed colonel of the Tenth Tennessee Volunteers in 1862, and from 1863 until the close of the war, with rank of brigadier general of volunteers, was active in Tennessee, where he was adjutant general, and where, in a campaign to protect the loyal mountaineers, he surprised and killed the Confederate General John H Morgan (Greenville, Sept 4, 1864) For bravery at Marion, Va, he was brevetted lieutenant colonel and for general services colonel in the regular United States army At the reorganization of the Tennessee State government towards the close of the war he was vice president of the convention (Jan. 9, 1865) for the revision of the constitution, and sat in the first Legislature elected thereafter Brevetted major general and commissioned colonel, he was in command of the district (and subdistrict) of Mississippi in 1867–68, and was prominent in the operations against the Modoc Indians in 1873

GILLE'NIA (Neo-Lat, named in honor of Arnold Gill, a German botanist) A genus of perennial plants of the family Rosaceæ, natives of the temperate parts of eastern North America The roots are used in medicine as a mild emetic, and in small doses as a tonic There are two species which are often called Indian physic, *Gillenia trifoliata*, also known as American ipecac, Indian hippo, and dropwort, and *Gillenia stipulata*, or bowman's root The plants of this genus grow to a height of about 2 feet, and on account of their graceful foliage are often planted in shrubberies

GILLESPIE, gĭl-lĕs'pĭ, ELIZA MARIA (known also by her religious name, "Mother Mary of St Angela") (1824–87). She was a cousin of Thomas Ewing (q v) After a conventual education at Somerset, Ohio, and Georgetown, D C, she entered the Congregation of the Holy Cross (1853), and in 1855 became mother superior of the Academy of St Mary, then at Bertrand, Mich, afterward removed by her to St Mary's, near Notre Dame, Ind At the beginning of the Civil War she organized among the sisters a board of hospital nurses, which, with the centre of work at Cairo, Ill, rendered effective service in the care of wounded and sick Upon the separation of her order in the United States from the European body in 1869, she became mother superior Consult the *In Memoriam, Mother Mary* (Notre Dame, Ind, 1887).

GILLESPIE, GEORGE (1613–48). A Scottish Presbyterian clergyman and prominent member of the Westminster Assembly He was born at Kirkcaldy, near Leith After a brilliant career as a student at St Andrews University he became domestic chaplain to Lord Kenmure, and in 1634 to the Earl of Cassilis While with the Earl of Cassilis he wrote his first work, *A Dispute against the English Popish Ceremonies Obtruded upon the Church of Scotland* (1637), which attracted considerable attention, and within a few months all available copies were called in and burned by order of the Privy Council In April, 1638, soon after the authority of the bishops had been set aside by the nation, Gillespie was ordained minister of Wemyss (Fife) by the Presbytery of Kirkcaldy, and in the same year preached a sermon before the General Assembly at Glasgow, pronouncing so decidedly against royal interference in matters ecclesiastical as to call for remonstrance on the part of the Earl of Argyll, then Lord High Commissioner In 1642 Gillespie was transferred to Edinburgh, but the brief remainder of his life was chiefly spent in London Already, in 1640, he had accompanied the commissioners of the peace to England as one of their chaplains, and in 1643 he was appointed to the Westminster Assembly Here he took a prominent part in almost all of the protracted discussions on Church government His works, which chiefly deal with the independence of the Church in spiritual matters, were published in Edinburgh (1843–48)

GILLESPIE, GEORGE DE NORMANDIE (1819–1909) A Protestant Episcopal bishop, born in Goshen, N Y He graduated at the General Theological Seminary, New York City, in 1840, and was ordained priest in 1843. He became rector of St Mark's Church, Leroy, N Y. (1841), St Paul's Church, Cincinnati (1845), Zion Church, Palmyra, N Y (1851), and St Andrews Church, Ann Arbor, Mich (1861) In 1875 he was made Bishop of the diocese of Western Michigan, and in 1877 he became a member of the State Board of Charities and Correction His writings include *The Communion of Saints, An Holy Priesthood, The Season of Lent*

GILLESPIE, GEORGE LEWIS (1841–1913). An American military engineer, born at Kingston, Tenn He graduated at West Point in 1862, and served with great gallantry throughout the Civil War He was president of the Mississippi River Commission in 1885, and later was division engineer on the Atlantic coast During the Spanish-American War he was in command of the Department of the East In 1901 he became a brigadier general and chief of engineers, and in 1904 major general, serving on the general staff as assistant chief of staff. He was retired in 1905

GILLESPIE, WILLIAM MITCHELL (1816–68) An American author, born in New York City He graduated at Columbia in 1834, and from 1845 was professor of civil engineering in Union College A forceful and profound scholar, he wrote *Rome as Seen by a New Yorker* (1845), *A Manual of Road-Making* (1847 and often), a translation of Comte's *Philosophy of Mathematics* (1851), *The Principles and Practice of Land-Surveying* (1855, 6th ed, 1858), a posthumously published *Treatise on Leveling, Topography, and Higher Surveying* (1871, edited by Staley), and other works

GILLETT, jĭl-lĕt′, EZRA HALL (1823–75). An American clergyman and author, born at Colchester, Conn He graduated in 1841 at Yale, and in 1844 at the Union Theological Seminary, and became pastor of a Presbyterian church in Harlem, N Y In 1868 he was appointed professor of political economy, ethics, and history in New York University In addition to numerous contributions to theological reviews, he published the *Life and Times of John Huss* (1863–64), a *History of the Presbyterian Church in the United States* (1864), *The Moral System* (1874), and other works

GILLETTE, WILLIAM HOOKER (1855–). An American actor and playwright He was born in Hartford, Conn, and studied in the universities of New York and Boston, while applying himself to the theatre He met with success as an actor in stock companies in the South and West, as well as in Boston and New York, and wrote a number of plays of great popularity, to the presenting of which he latterly devoted himself Among them are *Digby's Secretary* (1880, an adaptation from the German, which was, by compromise, combined with Charles Hawtrey's play, *The Private Secretary*, from the same source), *Esmeralda* (1881) (in which he collaborated with Mrs Burnett), *Held by the Enemy* (1886), *A Legal Wreck*, *Too Much Johnson* (1894), *Secret Service* (1895), *Because She Loved Him So* (1899), and *Clarice* (1906) He is best known by his dramatization of Sir Conan Doyle's *Sherlock Holmes* (1899) and his acting of the chief character Consult Hapgood, *The Stage in America, 1897–1900* (New York, 1901), Strang, *Famous Actors of the Day in America* (Boston, 1900), Clapp and Edgett, *Players of the Present* (New York, 1899), Winter, *The Wallet of Time* (2 vols, ib, 1913)

GILLIE, gĭl′lĭ (Gael, Ir *giolla*, lad, manservant) A Highland attendant, a boy, page, or menial, an outdoor servant, especially one in attendance on persons engaged in hunting or traveling Formerly, in Scotland, it was the duty of a servant, called a *gillie whitefoot* or *gillie webfoot*, to carry his master over brooks or watery places

GILLIES, gĭl′lĭz, JOHN (1747–1836) A Scottish historian and classical scholar He was born at Brechin, in Forfarshire, and graduated at Glasgow University A literary life in London was interrupted for a time by travels on the Continent, when he was tutor to the sons of John, Earl of Hopetoun In 1793 Gillies was appointed royal historiographer for Scotland His *History of Greece, its Colonies and Conquests* (1786), long superseded, was his most popular work, in its day it was of great value He also wrote *A History of the World* from Alexander the Great to Augustus (1807) and published various translations, entitled *Orations of Lysias and Isocrates* (1778), *Aristotle's Ethics and Politics* (1797), and *Aristotle's Rhetoric* (1823)

GILLINGHAM, gĭl′ĭng-am A town in Kent, England, 1 mile east-northeast of Chatham It has large dockyards, cement and brick works It is the centre of a fruit growing district noted for its cherries It has interesting archæological remains Gillingham fort was built in the reign of Charles I The Jezreelites, or the New and Latter House of Israel, have a large temple and school at Gillingham, which is their headquarters. The town was incorporated in 1903, it is governed by a mayor, 6 aldermen,

and 18 councilors The Royal Naval Hospital was opened in 1905 Pop, 1901, 42,745, 1911, 52,252

GIL'LIS (GILES) LAND An island to the east of Northeast Land, Spitzbergen, in lat 80° 10′ N, long 30° 32′ E It was discovered in 1707 by a Dutch whaler, Cornelis Giles, or Gillis Occasionally seen, it was never visited until its exploration in 1898 by Dr A G Nathorst Being entirely ice-capped, it has been called White Island and New Iceland

GILLISS, gĭl'ĭs, JAMES MELVILLE (1811–65) An American astronomer, born in Georgetown, D C He became a midshipman in the navy in 1827 He procured leave of absence in 1833, spent a year in scientific study at the University of Virginia, and continued his studies in Paris In 1836 he became assistant in the Bureau of Charts and Instruments in Washington, and two years later, in a small wooden building belonging to the Navy Department, organized the first working observatory in the United States He was made a lieutenant in 1838, and for five years conducted at Washington astronomical observations of great value, which were published by the government in 1846, containing the first catalogue of stars, and being the first report of astronomical observations to be published in America In 1842–43 he visited Europe to procure the equipment for the new government observatory at Washington, completed under his direction in 1845 He spent the years 1848–52 in Chile, where he made observations for the determination of the solar parallax, and studied the constellations of the Southern Hemisphere He observed solar eclipses in 1858 in Peru, and in 1860 on the northern Pacific coast of the United States, and after the departure of Lieut M F Maury at the outbreak of the war, succeeded him as superintendent of the National Observatory at Washington, a position which he held until his death. Under his control the observatory became one of the best equipped in the world He became a captain in 1862 His publications include *Astronomical Observations Made at the Naval Observatory* (1846), *The United States Astronomical Expedition to the Southern Hemisphere, 1849–52* (4 vols, 1854–58) Consult Gould, *Memoir*, in the *Biographical Memoirs* of the National Academy of Sciences, vol 1 (Washington, 1877)

GILLIVARE. See LAPLAND

GILLMORE, gĭl'môr, INEZ HAYNES (1873–) An American story writer She was born at Rio de Janeiro, Brazil, and was educated in Boston public schools, at the Boston Normal School, and at Radcliffe College She married Rufus Hamilton Gillmore in 1897 She was the first secretary of the first College Equal Suffrage League in America, and she became honorary vice president of the Massachusetts Woman Suffrage Association She is author of *June Jeopardy* (1908), *Maida's Little Shop* (1910), *Phœbe and Ernest* (1910); *Janey* (1911), *Phœbe, Ernest, and Cupid* (1912), *Angel Island* (1914), and contributions to magazines

GILLMORE, gĭl'môr, QUINCY ADAMS (1825–88) An American soldier and eminent military engineer, born at Black River, Lorain Co, Ohio Graduating at West Point in 1849, first in his class, and assigned to the Engineer Corps, he was assistant engineer in the building of Fortress Monroe until 1852, when he became assistant instructor of practical military engineering at West Point From 1856 to 1861 he was in charge of the Engineer Agency at New York, and in 1857–58 he was also in charge of the fortifications in New York harbor During the Civil War he acted as chief engineer of the Port Royal Expeditionary Corps in 1861–62, was chief engineer at the siege of Fort Pulaski, Ga, from February to April, 1862, was in command during the bombardment and capture of that fort, and on April 28, 1862, was made brigadier general of volunteers He then commanded successively the District of Western Virginia, the First Division of the Army of Kentucky, and the District of Central Kentucky, and on March 30, 1863, was brevetted colonel in the regular army From June 12, 1863, to April, 1864, he was in command of the Department of the South, and from July 16, 1863, to June 17, 1864, of the Tenth Army Corps, during which time he conducted the land operations against Charleston, S C, and participated in the battle of Drury's Bluff, Va, and in the defense of Bermuda Hundred In July, 1864, he commanded two divisions of the Nineteenth Army Corps in the defense of Washington and the pursuit of General Early (q v) On March 13, 1865, he was brevetted successively brigadier general and major general in the regular army, and on Dec 5, 1865, he resigned from the volunteer service After the close of the war he served as superintending engineer of fortifications on the Atlantic coast and was in charge of various river and harbor improvements of importance He was president of the Mississippi River Commission from 1879 to 1882, and became colonel of engineers in February, 1883 In 1876, as one of the judges at the Centennial Exposition, he presented to the Bureau of Awards several reports He published *Siege and Reduction of Fort Pulaski* (1862); *A Practical Treatise on Limes, Hydraulic Cements, and Mortars* (1863), *Engineering and Artillery Operations against Charleston, S. C, in 1863* (1865, supplement 1868), *Béton, Coignet, and Other Artificial Stones* (1871), *The Compressive Strength, Specific Gravity, and Ratio of Absorption of Building Stones of the United States* (1876), and *A Practical Treatise on Roads, Streets, and Pavements* (1876)

GILLOT, jĭl'ŏt, JOSEPH (1799–1873) An English manufacturer of steel pens, born at Sheffield He first began the manufacture of pens in 1830, and gradually introduced improvements, both in the pen itself and in manufacturing processes, until his pens came to be almost universally used He accumulated a large fortune, a part of which he expended in getting together a valuable collection of paintings

GILL-OVER-THE-GROUND. See GROUND IVY

GILLRAY, gĭl'rȧ, JAMES (1757–1815) An English caricaturist He was born at Chelsea, in July, 1757, of Irish descent, but little is known of him until he became a student of the Royal Academy, where he made a special study of art designs He began as an engraver, and his first works were two plates published in 1784, they were illustrations for Goldsmith's *Deserted Village* In 1792 he visited France, Germany, and Holland, in the same year he published his well-known caricature "John Bull and his Family Landing at Boulogne," and the large plate after Northcote, inscribed "La triomphe de la liberté, ou l'élargissement de la Bastille" Gillray has no rival as a caricaturist of the politics and manners of the years 1779–1811 His car-

toons represent the fashionable society at Vauxhall Gardens, lords and ladies, singers, soldiers, life at home, in the taverns, in the villages, and in the poor quarter of London among the patient, struggling artisans, but the most celebrated are those satirizing King George III and his Queen, the Prince of Wales, Pitt, and Napoleon His comedy was produced by the strongest contrasts He was a masterly draftsman of a vehement style and amazing fertility of fancy, almost brutal and coarse at times, yet capable of expressing the most delicate feeling and beauty His caricatures number more than 12,000, and his last work is dated 1811 His death, caused by intemperate habits, occurred in London, June 1, 1815 A satire on an "Irish Fortune-Hunter," or "Paddy on Horseback," is the earliest-known work, dated 1779, other political cartoons are "L'Assemblée nationale" or a "Grand Cooperative Meeting at St Anne's Hill" (1804), "A New Way to Pay the National Debt" (1796), "Temperance Enjoying a Frugal Meal" and a "Voluptuary under the Horrors of Digestion" (1792), "Anti-Saccharites" (1792), and "A Connoisseur Examining a Cooper" (1792)—the last two being fierce satires on the habits of the royal family Among his social caricatures are "Two-Penny Whist", "The Life of William Cobbett, Written by Himself," eight satirical plates (1809), "Elements of Skating," four plates (1805), "Rake's Progress at the University," five plates (1806) Consult Buss, *English Graphic Satire* (London, 1874), Wright, *The Works of James Gillray, with Story of his Life and Times* (ib, 1874), Everitt, *English Caricaturists*, (ib, 1885)

GILLS, gĭlz, SOLOMON A ship's-instrument maker, in Dickens's *Dombey and Son*, and a great crony of Capt Edward Cuttle

GILLYFLOWER, jĭl'ĭ-flou'ĕr (ME. *gyllofer*, from OF *gilofre, girofle, girofre*, corrupted from ML *caryophyllum*, from Gk καρυόφυλλον, *karyophyllon*, clove tree, from κάρυον, *karyon*, nut + φύλλον, *phyllon*, leaf, confused by popular etymology with Eng. *flower*) A popular English name for some of the cruciferous plants, prized for the beauty and fragrance of their flowers, as wallflower, stock, etc The clove pink, the wild original of the carnation, is also called clove gillyflower. The name is now used mostly for species of the genera *Cheiranthus* and *Matthiola* Species of the former furnish the different varieties of wallflowers, and of the latter the various kinds of stock See STOCK

GILMAN, gĭl'man, ARTHUR (1821–82) An American architect, born at Newburyport, Mass After his graduation at Trinity College (Hartford, Conn), he became known as a lecturer on architecture, and as a practical architect, whose earliest important work was the Boston City Hall From 1865 he was a resident of New York City, where he designed the original building of the Equitable Insurance Company. The original design of the State Capitol at Albany, also, was his work, though it underwent material alteration under other hands While a citizen of Boston, he was prominent in his endeavors for municipal improvement

GILMAN, ARTHUR (1837–1909) An American educator He was born in Alton, Ill, was educated in St Louis and New York, was engaged in banking in New York from 1857 to 1862, and then removed to Massachusetts, where he gave his attention chiefly to education and religious instruction, and in 1871 became editor of the publications of the American Tract Society In 1876, together with his wife, he devised a scheme for the collegiate instruction of women that developed into the Harvard Annex, of which he was executive officer When in 1894 the Annex became Radcliffe College, he was its regent for two years He founded, and in 1886 became the director of, the Gilman School for girls at Cambridge Besides contributing to the magazines, he published *First Steps in English Literature* (1870), *Boston, Past and Present* (1873), *First Steps in General History* (1874), *Shakespeare's Morals* (1879), *History of the American People* (1883), *Tales of the Pathfinders* (1884), *The Story of the Saracens* (1886), *The Story of Rome* (1885) and *Germany* (1906, with Baring-Gould), and other volumes in the "Story of the Nations" series, *The Discovery and Exploration of America* (1887), *The Making of the American Nation* (1887), *The Story of Boston* (1889), and edited various compilations

GILMAN, CAROLINE HOWARD (1794–1888) An American author, born in Boston She was the daughter of Samuel Howard, and married the Rev Samuel Gilman Some of her works once enjoyed considerable popularity Among them are *Recollections of a New England Housekeeper* (1835), *Recollections of a Southern Matron* (1836), *Poetry of Traveling in the United States* (1838), *Ruth Raymond* (1840), *Verses of a Life Time* (1849), and, with her daughter, Mrs Jervey, *Poems and Stories by a Mother and Daughter* (1872)

GILMAN, CHARLOTTE PERKINS (1860–). An American lecturer and author, born at Hartford, Conn She married C W Stetson in 1884 and George H Gilman in 1900 In 1890 she began giving lectures on ethics, economics, and sociology, and writing for the magazines on the same subjects She became known especially for her interest in labor problems and for her advocacy of woman's rights In 1914 a series of lectures which she gave in New York City on "The Larger Feminism" gained unusual attention In 1909 she became editor of *The Forerunner* Her writings include *Woman and Economics* (1898, 2d ed, 1899), *In This Our World*, a volume of verse (1898), *The Yellow Wall Paper* (1899), *Concerning Children* (1900), *The Home, Its Work and Influence* (1903, 1910), *Human Work* (1904), *What Diantha Did* (1910); *The Man-Made World* (1911); *The Crux* (1911), *Moving the Mountain* (1911)

GILMAN, DANIEL COIT (1831–1908) An American educator, born in Norwich, Conn He came from a New Hampshire family which migrated from Norfolk, England, in 1638 After graduating from Yale University in 1852, he studied and traveled in Europe He was connected with Yale (1855–72) as librarian, professor of physical and political geography, and secretary of the Sheffield Scientific school, was president of the University of California (1872–75), and then, as president of Johns Hopkins University, Baltimore, during the first 25 years of its existence, he contributed notably toward the establishment of true university education in the United States After his resignation he served until 1904 as president of the Carnegie Institution of Washington He was also president of many educational and philanthropic associations, received numerous honorary degrees,

and was a member of the American Academy of Arts and Letters He was appointed by President Cleveland one of the commissioners to determine the boundary line between Venezuela and British Guiana, he served as one of the Charter Commission of Baltimore, and he was president of the National Civil Service Reform League (1901–07) and of the American Oriental Society (1893–1906) As a member of three boards—the Peabody, the Slater, and the General Education—he was active in the promotion of education in the South His publications include a large number of reports and magazine articles, an introduction to Lieber's minor writings, an introduction to De Tocqueville's *Democracy in America*, a volume of speeches and essays entitled *University Problems*, a small volume on *Science and Letters in Yale*, and a memoir of James Dwight Dana, the geologist To the American Statesmen Series he contributed a memoir of President Monroe In 1901 he became one of the three general editors of the first edition of the NEW INTERNATIONAL ENCYCLOPÆDIA Consult Franklin, *Life of Daniel Coit Gilman* (New York, 1910) —His brother, EDWARD WHITING GILMAN (1823–1900), was born at Norwich, Conn, graduated at Yale in 1843, and, after studying theology at Union Theological Seminary and Yale Divinity School, was a tutor at Yale, and in 1849 was ordained a Congregational minister From 1871 until his death he was corresponding secretary of the American Bible Society, being chiefly concerned with its wide foreign correspondence

GILMAN, JOHN TAYLOR (1753–1828). An American Federalist political leader, Governor of New Hampshire for fourteen terms He was born at Exeter, N H, the son of Nicholas Gilman, a Revolutionary leader, and a brother of United States Senator Nicholas Gilman (q v) He was educated at Exeter and became a shipbuilder The day following the battle of Lexington he marched to Cambridge with the first company of minutemen from New Hampshire, and subsequently served as an aid to his father, who commanded the regiment of New Hampshire troops at the siege of Boston Later he became assistant to his father, then State Treasurer His first political office was in the State Legislature in 1779 He was a delegate from New Hampshire to the convention held in 1780 at Hartford, Conn, to devise means for the continuation of the war In 1782–83 he was a member of the Continental Congress, resigning to accept the office of State Treasurer, in succession to his father In 1786 he resigned the treasurership to act as commissioner, with John Kean of South Carolina and William Irvine of Pennsylvania, to settle the accounts of the old Confederation with the several States In 1788 he was a member of the New Hampshire Convention to adopt the Federal Constitution After another year's service as State Treasurer, he was elected, in 1794, Governor of New Hampshire This office he held until the close of 1805, and again from 1813 to 1816 Although opposed to the war policy of the national government, he engaged actively in providing defenses for the New Hampshire coast and frontier He sympathized with the movement that resulted in the Hartford Convention of 1814, but refused to take any action in the matter of sending delegates from New Hampshire, which was therefore represented only unofficially In 1816 he declined a reelection, and retired to private life Consult *The Gilman Family* (Albany, 1869)

GILMAN, LAWRENCE (1878–) An American writer on music He was born at Flushing, N Y, and studied art under W M Chase and at the Art Students' League of New York From 1896 to 1898 he was on the staff of the New York *Herald* At the same time he studied diligently by himself piano, organ, and composition In 1901 he became musical critic of *Harper's Weekly*, in 1901 assistant editor, in 1911 managing editor In his writings he shows himself thoroughly in sympathy with the most advanced thought in modern music His more important books are *Phases of Modern Music* (1904), *Edward MacDowell* (1905, revised and expanded 1909), *A Guide to Strauss' Salome* (1907), *A Guide to Debussy's Pelléas et Mélisande* (1907), *Aspects of Modern Opera* (1908) He also became known as a frequent contributor to leading magazines

GILMAN, NICHOLAS (1755–1814) An American statesman, born at Exeter, N H, son of Nicholas Gilman (1731–1813), who served with John Langdon during the Revolution and was State Treasurer in 1776–83 Nicholas the younger served during the Revolutionary War as adjutant in the First New Hampshire Regiment (Col Alexander Scammell's), in 1786–88 was a member of the Continental Congress, and in 1787 of the Constitutional Convention at Philadelphia From 1789 to 1797 he sat in the House of Representatives, and from 1805 until his death in the Senate

GILMAN, NICHOLAS PAINE (1849–1912). An American author, journalist, and clergyman, born at Quincy, Ill He graduated at the Harvard Divinity School in 1871, was pastor of various Unitarian churches in Massachusetts from 1872 to 1878 and in 1881–84, and professor of English literature at Antioch College, Yellow Springs, Ohio, in 1878–81 From 1885 to 1889 he was assistant editor of the *Unitarian Review*, from 1889 to 1895 editor of the *Literary World* (Boston), and in 1892–1900 editor of the *New World*, a Unitarian quarterly In 1895 he was appointed to the chair of sociology and ethics in the Meadville (Pa) Theological Seminary He wrote *Profit-Sharing between Employer and Employee A Study in the Evolution of the Wages System* (1889), which was translated into German, and received a gold medal at the Paris Exposition of 1889, *Conduct as a Fine Art The Laws of Daily Conduct* (1891), a nonsectarian textbook of ethics, *Socialism and the American Spirit* (1893, 2d ed, 1896), *A Dividend to Labor A Study of Employers' Welfare Institutions* (1899), *Methods of Industrial Peace* (1904)

GILMAN, SAMUEL (1791–1858) Clergyman and author He was born at Gloucester, Mass, graduated at Harvard in 1811, and in 1819 was ordained pastor of the Unitarian church at Charleston, S C, which he continued to serve till his death He was an active advocate of the temperance cause, and published *Memoirs of a New England Village Choir* (1829), *Pleasures and Pains of a Student's Life* (1852), *Contributions to Literature, Descriptive, Critical, Humorous, Biographical, Philosophical, and Poetical* (1856), as well as contributions to periodicals and translations of certain of Boileau's satires

GILMER, gil'mẽr, GEORGE ROCKINGHAM (1790–1859) An American lawyer and gov-

ernor, born at Lexington, Ga He was in the army in 1813–18 After serving in the State Legislature (1818–20), where he began the agitation for the establishment of the Supreme Court, he was twice Governor of Georgia (1829–31, 1837–39), a member of Congress (1821–23, 1827–29, 1833–35), and presidential elector for Hugh L White (1836) and for Harrison (1840) Consult his *Georgians Sketches of Some of the First Settlers of Upper Georgia, of the Cherokees, and the Author* (New York, 1855)

GILMER, JEREMY FRANCIS (1818–83) An American soldier, born in Guilford Co, N C He entered the engineers upon his graduation from the United States Military Academy in 1839 (with Halleck, Canby, Hunt, and Ord), saw service in the Mexican War, and surveyed battlefields near the city of Mexico, and until 1861 was active in making surveys, constructing fortifications, and executing various river and harbor improvements Upon the outbreak of the Civil War he entered the Confederate service, was appointed major of engineers, and became chief engineer on the staff of Gen A S Johnston. He was wounded at the battle of Shiloh, was later appointed chief of the engineering bureau at Richmond, and in 1863 was commissioned major general in the Confederate army In 1867–83 he was president and engineer of the Savannah Gas Company

GILMOR, gĭl'môr, HARRY (1838–83) An American soldier, born in Baltimore Co, Md He entered the Confederate army in 1861, was commissioned captain in 1862, in 1862–63 was imprisoned for five months at Fort McHenry, and in 1863 raised a cavalry battalion, of which he was made major He commanded the First Confederate Regiment of Maryland and in 1864 headed the advance of the forces of Gen J A Early into Maryland In 1874 he became police commissioner of Baltimore He wrote *Four Years in the Saddle* (1866)

GILMORE, gĭl'môr, JAMES ROBERTS (1822–1903) An American writer and editor, born in Boston, Mass He entered a counting room in 1836 and in 1847 established in New York City a cotton and shipping firm which did a leading business in several Southern States He was its president until 1857, when he retired from commercial life In 1862, with Robert J Walker, ex-Secretary of the United States Treasury, and Charles G Leland ("Hans Breitmann"), he founded in New York the *Continental Monthly*, devoted chiefly to the cause of emancipation, his interest in which he relinquished to Walker in 1863 In that year he became an occasional editorial writer for the New York *Tribune* In the summer of 1864 he and Col James F Jaquess, as unofficial agents of President Lincoln, went to Richmond to lay before President Jefferson Davis various peace proposals These were immediately rejected, since they did not provide for recognition of the independence of the Confederacy Gilmore's account of this mission in the *Atlantic Monthly* undoubtedly did much to break the ranks of the peace party in the North and to influence many to vote for Lincoln rather than McClellan in November, 1864 Gilmore engaged in business again in 1873, but retired 10 years later to devote himself wholly to literature His popular historical works have been much criticized by special students, but they are of great general value His earlier books were published under the nom de plume of "Edmund Kirke" His writings include *Among the Pines* (1862), *My Southern Friends* (1862), *Down in Tennessee* (1863), *Adrift in Dixie* (1863), *Among the Guerrillas* (1863), *On the Border* (1864), *Patriot Boys* (1864), *A Campaign Life of Garfield* (1880), *The Rear Guard of the Revolution* (1886), *John Sevier as a Commonwealth Builder* (1887), *Advance Guard of Western Civilization* (1888), *A Mountain White Heroine* (1889), *The Last of the Thorndikes* (1889), *Personal Recollections of Abraham Lincoln and the Civil War* (1898)

GILMORE, JOSEPH ALBREE (1811–67) An American politician, war Governor of New Hampshire He was born in Weston, Vt He had very little schooling, and his early business experience was obtained in a store in Boston In 1832 he settled at Concord, N H, where he became the proprietor of a large grocery store. In 1848 he became interested in railroading as a constructing agent, and was general superintendent of the Concord and Claremont Railroad until 1866—after the road was consolidated with the Manchester and Lawrence and other connecting roads In 1858 he was elected to the New Hampshire State Senate as a Republican. He was reelected in the following year and chosen President In March, 1863, he was nominated for Governor by the Republicans, when none of the three candidates received a majority of votes as required by the State constitution for an election by the people, the Legislature chose Gilmore, and in 1864 he was reelected by the people His administration of the office during the most trying period of the Civil War was marked by great energy and firmness, and largely through his exertions New Hampshire's contribution to the Union armies was increased from 15,500 to 33,258, an excess of 1800 over the State's quota

GILMORE, JOSEPH HENRY (1834–1918). An American educator, born in Boston In 1858 he graduated from Brown University (A M, 1861), and in 1861 from Newton Theological Institution Ordained to the Baptist ministry in 1862, he was pastor at Fisherville, N H, until 1864, and at Rochester, N Y, until 1867 He edited the Concord (N H) *Daily Monitor* in 1864–65, was acting professor of Hebrew at the Rochester Theological Seminary in 1867–68, and for 40 years, until he became professor emeritus in 1908, occupied the chair of rhetoric, logic, and English at the University of Rochester. He wrote the widely used hymn "He Leadeth Me," and published, besides a number of textbooks on rhetoric and speaking, *Familiar Chats about Books and Reading* (1892) and *Outlines of English and American Literature* (1905).

GILMORE, PATRICK SARSFIELD (1829–92) A celebrated American military bandmaster, born near Dublin, Ireland His first musical experience was with the town band of Athlone, and when but 18 years of age he left his native city to go to Canada with an English band Almost immediately on his arrival he crossed the boundary into the United States and settled in Salem, Mass, where he became conductor of a military band The National Peace Jubilee of 1869, and the World's Peace Jubilee of 1872, held on Boston Common, gained him an international reputation The entire musical ensemble in 1869 consisted of an orchestra of 1000, and a chorus of 10,000 voices,

which number was doubled in the festival of 1872 Having settled in New York in 1874, Gilmore and his band began concert tours which were as popular as they were successful, the tours covering Canada, Great Britain, and several continental European cities of importance His successor in this branch of musical organization was Sousa (q v) He died in St Louis, Mo

GILMOUR, gĭl′mûr, RICHARD (1824–91) A Roman Catholic bishop of Cleveland, Ohio, born in Glasgow, Scotland In 1842 he became a Catholic, he had been a Scottish Covenanter He was educated at Mount St Mary's College, Emmitsburg, Md, and in 1852 was ordained priest Consecrated Bishop of Cleveland in 1872, he became widely known for his interest in Catholic education, establishing *The Catholic Universe* (1874) and organizing the Catholic Central Association (1875) He wrote a *Bible History* (1869) and compiled readers, primers, and spelling books called *The Catholic National Series*

GILOLO, jē-lō′lō, or HALMAHERA (native name, *Bato-tsima*) The largest of the Moluccas (q v) or Spice Islands, situated between lat 2° N and 1° S and long. 127° 27′ and 129° E, east of Celebes (Map East Indies, G 5) Its area is estimated at over 6950 square miles It is very irregular in its form, which resembles Celebes in its peninsular configuration The surface is mountainous and the climate tropical The soil is of great fertility The island belongs to the Netherlands, and is included in the Residency of Ternate. The chief towns are Galela and Patani The population is estimated at 100,000 and consists of Malays and Alfuros

GILPIN, gĭl′pĭn, BERNARD (1517–83) An English clergyman, known as the "Apostle of the North" He was born at Kentmere, Westmoreland He studied at Queen's College, Oxford Soon after graduation he was chosen fellow of his college and took orders in 1542 On the opening of the new foundation of Christ Church Wolsey made him one of the head masters At that time the university was divided on the subject of the Reformation Gilpin at first took ground against it, but later embraced it. In 1552 he became vicar of Norton and was licensed by Edward VI as a "general preacher" On the King's death he went abroad and lived at Louvain and Paris Returning to England during Queen Mary's reign, he found the persecution of the Protestants still in progress. His uncle, Bishop Tunstall, of Durham, gave him the living of Easington and the archdeaconry of Durham, later the rectory of Houghton-le-Spring, protecting him also, notwithstanding his open avowal of Protestant opinions He devoted himself to the diligent prosecution of his parish work and to itinerant labors through the country Queen Elizabeth offered him the bishopric of Carlisle, which he declined He continued until his death rector of Houghton, residing constantly in his parish except when he visited the ruder parts of the county of Northumberland The people in certain districts had long led a lawless life, subsisting mostly on plunder Gilpin went fearlessly among them and did much to change the character of the country His chief labors, however, were in his own parish of Houghton, which included 14 villages He organized and endowed a school, and expended his funds freely for education and charity He was a bachelor and in hospitality resembled the character ascribed to the primitive bishops Every fortnight 40 bushels of corn, 20 bushels of malt, and a whole ox were consumed in his house, besides ample supplies of many other kinds He maintained an open table for his people every Sunday from Michaelmas to Easter The rectory house was also open to all travelers, and so great was the reverence which surrounded him that his liberality was rarely abused He died at Houghton-le-Spring, March 4, 1583 Consult his life by Carleton (London, 1629, reprinted, Glasgow, 1852), also the life by Collingwood (London, 1884) Four of his sermons were reprinted (Houghton-le-Spring, 1835)

GILPIN, HENRY DILWOOD (1801–60) An American lawyer He was born in Lancaster, England, where his father, Joshua Gilpin, a Philadelphia manufacturer and author, was living at the time He graduated at the University of Pennsylvania in 1819, was admitted to the bar in 1822, and rapidly established himself in an extensive practice in Philadelphia In 1832 he was appointed by Jackson to succeed Dallas as United States District Attorney for Pennsylvania and served until 1837 In 1832–34 he was one of the government directors of the United States Bank and actively seconded Jackson's radical efforts to destroy that institution This activity reacted upon him towards the end of the administration, when the Senate refused to confirm his appointment as Governor of Michigan Territory In 1837 he was appointed by Van Buren Solicitor of the United States Treasury, and in 1840 he was appointed Attorney-General of the United States, a position which he retained until the inauguration of President Harrison He spent his remaining years in travel and literary pursuits and in the practice of his profession, for the next 20 years he was one of the best-known members of the American bar From 1826 to 1832 he edited the *Atlantic Souvenir*, the first American literary annual He was a frequent contributor to magazines and reviews Besides legal reports, he edited *The Papers of James Madison* (3 vols, 1840) and *Opinions of the Attorney-Generals of the United States from the Beginning of the Government to 1841* (2 vols, 1841) He also published *Biography of the Signers of the Declaration of Independence* (1826), a translation of Chaptal's *Essay on Import Duties and Prohibitions* (1841), *Life of Martin Van Buren* (1844) Consult the *Memorial* compiled by his wife (Philadelphia, 1860)

GILPIN, JOHN The hero of a humorous poem by William Cowper (q v), first published in the *Public Advertiser* in 1782 Cowper heard the story from Lady Austen, who in turn had heard it in her childhood As to the historical reality of John Gilpin, there is a discussion in *Notes and Queries* (London, 2d series, viii, ix x, 1856, 3d series, ii, 1862, 5th series, ix, 1874 6th series, i, ii, v, 1880)

GILPIN, WILLIAM (1724–1804) An English author, born at Scaleby Castle, near Carlisle, and educated at Oxford For 30 years he conducted a school at Cheam, Surrey, where he introduced with much success important educational reforms His works, embracing biographies, descriptions of natural scenery, and religious publications, include lives of *Bernard Gilpin, Latimer, Cobham, Huss, Wycliffe, Zisca, Jerome of Prague, Lectures on the Church Catechism* (1779), *Exposition of the New Testament* (1790), *Remarks on Forest Scenery*

and Other Woodland Views (1790); and many volumes describing the British Isles, illustrated by his sketches in summer vacations

GIL POLO, hēl pō'lō, GASPAR. See POLO, GASPAR GIL

GILSONITE, gil'son-īt (named in honor of S H Gilson, owner of a large deposit of the mineral) A black, brilliant bitumen, with conchoidal fracture, hardness 2 to 2 5 and specific gravity 1 065 to 1 07 It is found in veins in the Tertiary shales of northeastern Utah and western Colorado Gilsonite is a nonconductor of heat and electricity and is soluble in carbon disulphide, chloroform, and warm oil of turpentine An analysis gave C, 88 30, H, 9 96, N + O, 0 32, S, 1 32, ash, 0 10 The mineral is utilized in making paints and varnishes Consult Eldridge, "The Uintahite (Gilsonite) Deposits of Utah," *Seventeenth Annual Report United States Geological Survey*, part i (Washington, 1896) See ASPHALT

GILT'HEAD' (so called from the coloring on its head) A small fish (*Sparus auratus*) of the family Sparidæ, to which the scup, porgy, and sheepshead belong It is numerous on the coast of Europe and Africa, near the shore in small shoals, feeding upon shellfish The back is silvery gray, shaded with blue, the belly like polished steel, the sides have golden bands, and there is a half-moon-shaped golden spot between the eyes, from which it derives the name "gilthead" This fish was very generally kept in the *vivaria* of the ancient Romans, being much valued and easily fattened The name is also given to a British wrasse (q v)

GIL VICENTE, zhēl vē-sān'tā See VICENTE

GIL Y ZÁRATE, hēl ē thä'ra-tā, ANTONIO (1793–1861) A Spanish dramatist and literary historian, born in the Escorial He was educated in France and upon his return to Spain was employed in the Ministry of the Interior His earlier literary activity (1826–29) was hampered by the political and ecclesiastical censorships, though in this period he produced the tragedy *Doña Blanca de Borbón* He became the editor of several of the Opposition journals and afterward held a number of official positions, including those of director and subsecretary in the ministries of Commerce, Instruction, and Public Works After some years he again turned to literature His works include the tragedy *Don Rodrigo;* the dramas *Carlos II el hechizado, Don Alvaro de Luna,* and *Guzmán el bueno,* and the comedy *Don Pedro de Portugal,* and others His dramatic works were published in Paris in 1850. He also wrote *De la instrucción pública en España* (1855), a *Manual de literatura* (4th ed, Madrid, 1851–56), and some critical studies

GIMBALS, gim'balz (ME. *gemel,* from OF. *gemeau,* fem *gemelle,* twin, from Lat *gemellus,* twin) A contrivance for suspending objects on board ship so that they may remain horizontal or vertical notwithstanding the motion of the ship As usually fitted, it consists of a ring carrying pivots on its circumference which rest in sockets in a frame or box, and of a second set of pivots on the object (as a compass or mercurial barometer) which rest in sockets so placed on the inner surface of the ring as to permit an oscillatory motion at right angles to that of the ring

GIMLET, gim'lĕt See BORING MACHINERY

GIMLI, gĕm'lē (Icel, heaven's roof) In Norse mythology, a great hall at the world's southern end, brighter than the sun It will stand when heaven and earth have passed away, and good and upright men will inhabit the place to all eternity

GIMP, or **GYMP** (from Fr *guimpe,* nun's wimple, from OF *guimple,* wimple, OHG *wimpal,* veil, Eng *wimple*) A kind of trimming for dress, curtains, furniture, etc, made either of silk, wool, or cotton Its peculiarity is that it consists of a fine wire or cord whipped around and completely covered with fine thread See LACE

GIN, jin (from *geneva,* from Dutch *jenever,* from OF *genevre,* Fr *genièvre,* juniper, from Lat *juniperus,* juniper), or GENEVA An alcoholic drink distilled from malt or from malt and unmalted barley or other grain and afterward rectified and flavored with juniper berries The imitation gin which forms the common spirituous drink of the lower classes of London and vicinity is alcohol flavored with oil of turpentine and common salt, each rectifier having his own particular recipe for regulating the quantities to be used The alcoholic strength of gin, as commonly sold, ranges from 22 to 48 per cent The amount of sugar varies from 2 to 9 per cent The larger part by far of the spirit is made in Holland and is exported to other countries, especially to America and northern Europe See LIQUORS

GIN, COTTON See COTTON, COTTON GIN, COTTON SEED

GINAIN, zhē'nān', PAUL RENÉ LÉON (1825–98) A French architect, born in Paris A pupil of Lebas, he won the Grand Prix de Rome in 1852 After his return from Italy he practiced in Paris and in 1859 won one of the prizes in the competition for the new Opera House (See GARNIER, JEAN LOUIS CHARLES) He was professor at the Ecole des Beaux-Arts from 1880 until his death He designed the church of Notre Dame des Champs, the Lying-in Hospital, the library of the School of Medicine, and several other schools His most admirable work was the Musée Gallièra, the most beautiful of the lesser public buildings of Paris

GINATILÁN, hē'na-tē-lan' A town of Cebú, Philippines, situated on the southwest coast, at the mouth of the Río Ginatilán It is in a level section, where corn, rice, millet, sugar cane, tobacco, cotton, cacao, etc, are cultivated, and the forests of the vicinity yield valuable timber Pop, 10,617

GINCKELL, G See GINKEL, G

GINDELY, gĕn'de-lē, ANTON (1829–92) An Austrian historian, born and educated in Prague He was appointed professor at the Oberrealschule in 1853 and at the university in 1862 About the same time he was made archivist for the Kingdom of Bohemia. Besides the important *Geschichte des dreissigjahrigen Krieges* (1869–80), not completed, his principal publications include *Geschichte der bohmischen Bruder* (1856–57), *Rudolf II und seine Zeit* (1862–65), *Waldstein wahrend seines ersten Generalats* (1886), which provoked violent opposition, and *Ueber des Johann Amos Comenius Leben und Wirksamkeit* (2d ed., 1893) Posthumously appeared *Geschichte der Gegenreformation in Bohmen,* ed by Tupetz (1893), and *Beitrage zur Geschichte des dreissigjahrigen Krieges,* ed by Hirn (1900) He also contributed numerous essays to the *Abhandlungen* of the Vienna Academy and from 1877 to 1892

edited *Bohmische Landtagsverhandlungen von 1526 an bis auf die Neuzeit*

GINES DE PASSAMONTE, hē'nās dā pas'sa-mōn'tā One of the many thankless debtors to the chivalry of Don Quixote, in Cervantes' romance of that name He is a galley slave whom the knight sets free and who immediately joins his fellows in attacking their rescuer

GINÉS DE SEPÚLVEDA, JUAN See SEPULVEDA.

GINEVRA, jē-nēv'ra An Italian bride whose tragic fate was commemorated by Samuel Rogers in a poem entitled "Italy" On her wedding day she concealed herself in sport within an oaken chest whose spring lock fastened her down The guests sought for her in vain and not until years had passed was it discovered how she had met her death The chest and a portrait of the lady were shown to the poet on his visit to Modena

GINGER, jĭn'jēr (AS *gingiber*, OF *gengibre*, from Lat. *zingiber*, Gk *ζιγγίβερις*, *zingiberis*, ginger, from Ar, Pers *zanjabīl*, from Prak *singabēra*, from Skt *śrngavera*, ginger), *Zingiber* A genus of plants of the family Zingiberaceæ, natives of the East Indies The species, of which there are about 20, are perennial herbs with annual stems, creeping rootstocks, and leaves in two opposite rows The flowers are in compact spikes with bracts The rootstocks of most of the species are used as a condiment and in medicine The most valuable and generally used are those of the common ginger (*Zingiber officinale*), sometimes distinguished as the narrow-leaved ginger, now cultivated in various tropical countries In the East Indies this plant has been cultivated from time immemorial, in the West Indies, particularly in Jamaica, from whence the finest quality is derived, and Sierra Leone, from both of which, as well as from the East Indies, its rootstocks —the ginger of commerce—are a considerable article of export Like the banana and other plants that have long been in cultivation, ginger is grown wholly from cuttings, having apparently lost the ability to set seed The rootstock is about the thickness of a man's finger, knotty, fibrous, and fleshy when fresh The stems are reedlike, generally 3 or 4 feet high, invested with smooth sheaths of the linear-lanceolate smooth leaves The flowers are not produced on the leafy stems, but on short scapes in spikes about the size of a man's thumb, and are of a whitish color, the lip streaked with purple The cultivation of ginger is extremely easy wherever the climate is suitable In India it is carried on to an elevation of 4000 or 5000 feet on the Himalayas, in moist situations It may be cultivated at higher latitudes if the rootstocks are taken up and protected during the winter In harvesting the crop the rootstock is taken up when the stems have withered and is prepared for the market either by scalding in boiling water—in order to kill it—and subsequent drying, or by scraping and washing The first method yields black or coated ginger, the second white or scraped ginger, the blackest of black ginger, however, being only a stone color, and the whitest of white ginger very far from perfectly white, unless bleaching be employed, as is done not unfrequently to improve its appearance—a process not otherwise advantageous Ginger found in the shops is sometimes covered with a white coating, usually of lime This is thought to improve its appearance, but usually covers an inferior grade There is a considerable difference, however, in the original color of the rootstocks of ginger of different countries, which is supposed to be owing to difference in the varieties cultivated The uses of ginger, both in medicine as a stimulant and a carminative, and in domestic economy as a condiment, are too well known to require particular notice The principal constituents of ginger root are a pale yellow volatile oil called "oil of ginger," gingerol, oleoresin, and often as much as 20 per cent of starch The yield of oleoresin is from 5 to 8 per cent Medicinally ginger is used as a fluid extract, oleoresin, tincture, powder, and in various standard preparations as compound rhubarb powder, etc. Candied ginger, or preserved ginger, consists of the young rootstocks preserved in sugar and is now exported in considerable quantity from China as well as from the East and the West Indies It is a delicious sweetmeat, and is useful also as a stomachic Essence of ginger, much used for flavoring, is in reality a tincture prepared of ginger and alcohol Sirup of ginger is used chiefly by druggists for flavoring Ginger tea, an infusion of ginger in boiling water, is a domestic remedy very useful in cases of flatulence Ginger beer is a well-known beverage flavored with ginger Ginger wine is a cheap liquor flavored with ginger Ginger was known to the Romans and is said by Pliny to have been brought from Arabia

Another species of ginger is zerumbet (*Zingiber zerumbet*), also called broad-leaved ginger, cultivated in Java, and of which the rootstock is sometimes erroneously called round zedoary The rootstock is much thicker than that of common ginger and is less pungent The rootstock of the cassumunar (*Zingiber cassumunar*), sometimes called yellow zedoary, has a camphor-like smell and a bitter aromatic taste It acquired a high reputation in England and throughout Europe about the close of the seventeenth century as a stimulant and stomachic, but it soon sank into disuse The rootstock of the mioga (*Zingiber mioga*) is less pungent than ginger and is much used in Japan Cattle sent to graze in the jungles of northern India during the rainy season are said to be fed the rootstock of a species of ginger (*Zingiber capitatum*) to preserve their health The root of *Asarum canadense* is sometimes called Indian ginger, or wild ginger, in North America, and is used as a substitute for ginger It has a grateful aromatic odor and taste and is stimulant, tonic, and diaphoretic. See ASARABACCA, Plate of FLAVORING PLANTS

GINGER, WILD See ASARABACCA

GINGERBREAD TREE See DOOM PALM

GINGER FAMILY See ZINGIBERACEÆ

GINGHAM, gĭng'am (probably from Javanese *ging-gang*, perishable, fading, less plausibly from Fr *Guingamp*, a town in Brittany) A cotton fabric of plain weave, originally introduced from India It differs from calico in that its colors are dyed in the yarn and woven in in stripes or checks and not afterward printed At first the Indian ginghams consisted of cotton cloths, with two or more colors arranged as a small checkered pattern, now a great variety of designs and color combinations are found in this material, which is used for women's and children's summer gowns and aprons The whole piece is woven with yarn of one color.

Other cotton stuffs, such as zephyrs and chambrays, partake of the nature of ginghams

GIN'GILI See SESAMUM

GINGIVI'TIS See GUMS, DISEASES OF

GINGUENÉ, zhăn'ge-nā', PIERRE LOUIS (1748–1816) A French man of letters, born at Rennes He first came into prominence through his critical articles to the *Mercure de France* and later by his verses In 1791 he published *Lettres sur les Confessions de J J Rousseau,* in which he praises Rousseau In the beginning of the Revolution he spread the principles of justice and of liberty in his paper, *La Feuille Villageoise* (1791–94), but when his paper criticized the ensuing excesses, Ginguené was imprisoned As Director General of the Commission of Public Instruction, he aided greatly in the reorganization of popular education from 1794 until 1797, when he was appointed by the Directory Minister Plenipotentiary to Sardinia In 1799–1802 he was a member of the tribunate Meanwhile he had been contributing to the *Histoire littéraire de la France* (begun by the Benedictines) The last years of his life were devoted to his *Histoire littéraire de l'Italie,* completed by Salfi (1811–19, 2d ed, by Daunou, 14 vols, 1824–35)

GINIGARÁN See JINIGARÁN

GINKEL, gĭn'kel, or **GINCKELL** GODART VAN (1630–1703), first EARL OF ATHLONE A Dutch general in the English army The eldest son of Godard Adriaan van Reede, Baron Ginkel, he was born at Utrecht in 1630 He was trained for the army and in 1688 accompanied William of Orange to England The following year he distinguished himself in the capture of a mutinous Scottish regiment at Sleaford, Lincolnshire, and in 1690 went to Ireland with the King and was conspicuous in command of a body of Dutch cavalry at the battle of the Boyne He was left as general in chief when William returned to England He captured Ballymore, reduced Athlone, defeated Saint-Ruth at Aughrim with terrible slaughter, marched on Galway, which capitulated, and completed the conquest of Ireland by taking Limerick. His return to London through England resembled a triumphal progress He received the thanks of Parliament and was created Baron of Aughrim and Earl of Athlone. He continued in the English service and in 1692 accompanied William to the Continent He was present at the battle of Landen and assisted in the destruction of the French magazines and stores at Givet At the renewal of hostilities in 1702 he commanded the Dutch troops under Marlborough, but before the campaign had proceeded far, died, after two days' illness, at Utrecht, Feb 11, 1703

GINKGO, gĭnk'gō *or* jĭnk'gō (Jap, from Chin *yinhing,* silver apricot, from *yin,* silver + *hing,* apricot) A genus of plants represented by a single living species, which is the sole survivor of an important ancient group of gymnosperms known as the Ginkgoales The *Ginkgo biloba* is the well-known maidenhair tree of cultivation, a popular name suggested by the fact that the leaves resemble those of the ordinary maidenhair fern (*Adiantum*). It has been cultivated for centuries in China and Japan as a sacred tree in connection with temple groves, and it has become common in ornamental cultivation in all civilized countries

The tree has the general habit of a conifer, with central shaft and wide-spreading branches It is recorded that it sometimes reaches a height of nearly 100 feet and a trunk circumference of more than 25 feet The characteristic leaves have long and slender petioles, with broad, wedge-shaped, and variously lobed blades, and a distinctly forking vein system The leaves are also deciduous, a very rare habit among gymnosperms The spore-bearing organs—i e, the stamens and ovules—are borne upon short, spurlike shoots, the stamens being in loose, catkin-like clusters while the ovules usually occur in pairs at the summit of a long stalk As a rule, but a single one of the pair of ovules develops into the mature seed, a development which occurs whether fertilization takes place or not

Formerly *Ginkgo* was included among the conifers, but further knowledge of its structure has caused it to be set apart as a group by itself, equal in rank to Cycadales, Coniferales, and Gnetales, the other three living groups of gymnosperms Prominent among the recent discoveries in connection with *Ginkgo* has been the discovery of ciliated (hence motile) male cells, identical in general character with those discovered in the Cycadaceæ (q v) The embryo is an exception among gymnosperms, since it does not develop the usual long and slender suspensor As in the cycads, the embryo develops two cotyledons, and between them there is a very conspicuous plumule (shoot bud) *Ginkgo* also shares with cycads the feature that its seed becomes plumlike, a testa with fleshy outer and stony inner layers being organized Often without pollination, and hence, of course, without fertilization, the seed attains its usual size, and the two layers of the testa are developed The starchy kernel of the seed has an almond-like flavor and is eaten, after slight roasting, by the Chinese.

The *Ginkgo* was introduced into the United States towards the close of the eighteenth century, and, because of its symmetrical shape and freedom from attacks of injurious fungi and insects, it has come into favor as an ornamental and street tree It is hardy as far north as Massachusetts, and at Washington, D C, it grows quite well, several streets being planted with this species Where employed as a street tree, only staminate specimens should be planted, so as to escape the annoyance of the falling disagreeable-smelling fruits in autumn

The leaves of *Ginkgo* are so characteristic that they are unusually trustworthy evidence of the existence of the group as fossils Such leaves are found in abundance down to the Coal Measures, and some of them at least must have belonged to Ginkgoales The most important fossil leaf genus referred to this order is the Mesozoic *Baiera* It is evident that Ginkgoales were abundant and somewhat diversified during the Mesozoic, their greatest extension occurring during the Jurassic, and it is altogether probable that they existed near the close of the Paleozoic. Jurassic remains of the group have been found in every country, from the Arctic regions to the south temperate regions, being abundant in England, throughout Europe, Siberia, China, Japan, North America, and Australia The prominent genera were *Ginkgo* and *Baiera*—the former becoming more abundant in the more recent periods and in the more northern latitudes, the latter including the majority of the older representatives of the group Consult A C Seward, "Maidenhair Tree (*Ginkgo*

biloba)," in *Annals of Botany*, vol xiv (London, 1900), and S W Maury, *The Ginkgo* (New York, 1910) See Plate of GYMNOSPERMS

GINN, gĭn, EDWIN (1838–1914) An American publisher and peace advocate He was born at Orland, Me, and graduated in 1862 from Tufts College (A M, 1865) He founded, and was until his death head of, the firm of Ginn and Company, among the leading publishers of school and college textbooks in the United States, whose first book, Allen's *Latin Grammar*, was published in 1868 Long interested in social questions and in the world peace movement, in 1909 he set aside a million dollars to be used after his death to endow a World Peace Foundation In the meantime he contributed $50,000 annually to carry on the work of the foundation, which was established in 1910 He also founded an International School of Peace in 1913 One of his public addresses was published under the title *Organizing the Peace Work* (1913)

GINNUNGAGAP, gĭn'nōōng-a-gap'. See BURI

GINS'BURG, CHRISTIAN DAVID (1831–1914) An English biblical scholar He was born in Warsaw, Russian Poland, and was educated at the rabbinical school there, but went to England when he was a young man In 1857 he published *The Song of Songs*, with a valuable commentary and summary of previous criticism, and received an honorary LL D from Glasgow He wrote critical and historical commentaries on Ecclesiastes (*Coheleth*, 1861) and Leviticus (1882) and in 1870 was appointed one of the revisers of the Old Testament His great work was on the Masora—text (1880–86), Masoretico-critical edition of the Hebrew Bible (1894, 2d ed, 1911), and introduction (1897), also the Pentateuch (1908) and Isaiah (1909), revised after the Masora Among his other publications are *The Karaites* (1862), *The Essenes* (1864), *The Kabbalah* (1865), *The Moabite Stone* (1870), with Salkinson, a Hebrew version of the New Testament, and a series of facsimiles of Hebrew manuscripts of the Old Testament (1897–98)

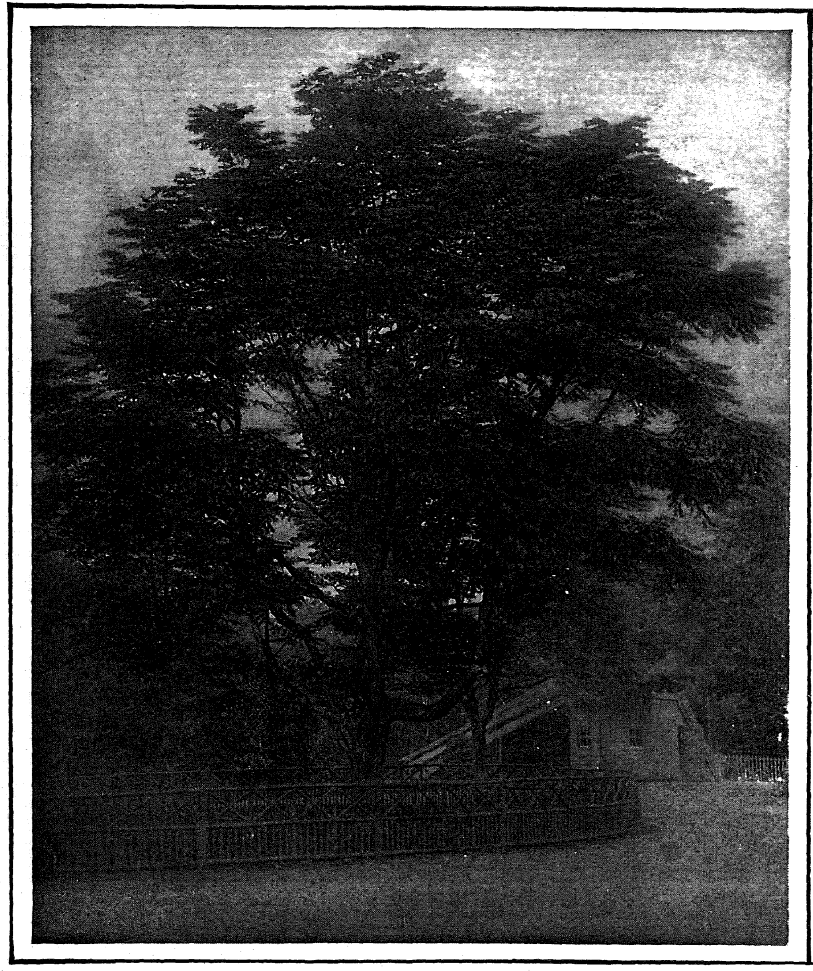
GINSENG, jĭn'sĕng (Chin *jin-tsang*, likeness of a man, less probably, first of plants) The yellowish root of *Panax ginseng*, highly esteemed as a medicine by the Chinese, who believe that it possesses extraordinary virtues for all diseases, particularly for exhaustion of body and mind It was first referred to in English in 1654, in a translation of Martini's *History of the Conquest of China*, in which it is merely mentioned, but in De la Loubere's account of Siam in 1688 it is described as the most esteemed of all plants of the East The Tatars are said to drink a decoction of the leaves as tea In Siam the root was chewed in the same manner as coca is by the Peruvian Indians Loubère says· "he that hath this root in his mouth will hold out at labor as long again as he that hath it not" Specimens resembling the human form are sometimes sold for their weight in gold This species, which is a native of China and adjoining territory, is from 1 to 2 feet tall, has five almost smooth leaves, with long petioles, between which arises the long-stalked umbel of inconspicuous flowers, which are succeeded by numerous scarlet berries It is cultivated in China and Korea A description of this species and its properties led to the discovery in 1716 of the American species *Panax quinquefolium*, which so closely resembles Asiatic ginseng that an extensive export trade of wild roots soon followed its introduction in China Its natural range is from the borders of the Mississippi eastward, in the Southern States it is almost entirely confined to the highlands and the mountains The Northern root is considered of superior quality and commands the highest prices The decreasing supply of wild ginseng has been insufficient to meet the demand, and this led, in various localities, to many experiments in growing ginseng, all of which failed until about 1885, when George Stanton grew the plant in beds in the forest at Apulia, N Y He later succeeded in growing it under an artificial shade of lath Since the publishing of his methods interest in the plant has increased, and many beds have been set out The small quantities of cultivated root so far marketed have commanded 20 per cent or more in advance of the price paid for wild roots gathered in the same district Ginseng succeeds best in well-drained, loose, friable loam, rich in humus, potash, and phosphoric acid, but not in nitrogen In its present state of development the root requires about five years to reach marketable size Two fragrant aromatic species, *Panax fruticosus* and *Panax cochleatus*, natives of the Moluccas, are used in India as medicine In European and American practice none of these species are employed to any extent Consult Kains, *Ginseng* (New York, 1903), and Harding, *Ginseng and Other Medicinal Plants* (Columbus, Ohio, 1908)

GINTL, gĭn't'l, WILHELM FRIEDRICH (1843–1908) An Austrian chemist, a son of the physicist Julius Wilhelm Gintl He was born and educated in Vienna and was appointed professor of chemistry at the German Polytechnic Institute in Prague in 1870 From 1878 to 1889 he was a member of the Bohemian Diet In 1902 he entered the Austrian House of Peers He was the founder and first president of the Austrian Society for the Promotion of Chemical Industry He became widely known through his *Studien uber Crookes strahlende Materie und die mechanische Theorie der Electricitat* (1880)

GINZ'BERG, ASHER (pen name, AHAD HA-'AM) (1856–1927). A Russian scholar and founder of Zionism, born at Skvira, Kiev, Russia He studied the Talmud in a Jewish heder, or elementary school, and between 1882 and 1884 was at Vienna, Berlin, and Breslau Settling in Odessa in 1886, he founded in 1889 the Zionist League (Bene Mosheh) to improve Hebrew education, disseminate knowledge of Hebrew literature and culture, and care for the interests of the Palestinian Hebrew settlements In 1897 he attended the Zionist Congress at Basel, Switzerland, where he opposed the ideas of Dr Herzl, and from that time he became known as the leader of the "moral," as opposed to the "political," Zionism He inspected the Palestinian colonies in 1900 He became editor of *Keweret* in 1890 and of *Ha-Shiloah* in 1896 Ginzberg's writings in Hebrew came to be more widely read than those of any other contemporary author using the same language His articles were collected and published under the title *Al Parashat Derakim* (1895, 2d ed, 1902) Some of them were translated into German and Russian, and into English by Leon Simon under the title *Selected Essays* (1912)

GIOBERTI, jō-bâr'tē, VINCENZO (1801–52).

GINKGO AND KENTUCKY COFFEE TREE



KENTUCKY COFFEE TREE (*Gymnocladus Canadensis*).

GINKGO TREE (*Ginkgo biloba*).

An Italian philosopher and statesman, born in Turin Educated in the Church, he was ordained to the priesthood in 1825 and subsequently appointed professor of theology in the university of his native city On the accession of Charles Albert he was selected as chaplain to the court, an office which he filled till 1833 In the rising political agitation Gioberti was accused of promoting the Liberal movement, dismissed from court, and suffered an imprisonment of four months His name was stricken from the list of doctors of theology on the ground that through his teachings he was a corrupter of youth He went to Paris and shortly after to Brussels, where he spent 11 years as private tutor in an academy, pursuing his studies in his leisure hours Gioberti looked upon the papacy as the divinely appointed agency for the elevation of Italy among the nations A confederation of states subject to papal arbitration, and having in the King of Piedmont a military protector, was his scheme for the unity and regeneration of Italy These views he developed in *Del primato civile e morale degli Italiani* (1843) The liberal and conciliatory policy adopted by Rome on the accession of Pius IX, a warm admirer of the *Primato,* appeared as the verification of Gioberti's predictions and increased his popularity On his return to Italy in 1848 he was received with ovations from all classes of the people and was chosen by several towns as their representative in Parliament The King appointed him senator, he subsequently was elected President of the Chamber of Deputies, and in December, 1848, became Prime Minister, but, owing chiefly to the failure of his attempt to bring about an agreement between the Pope and the Grand Duke of Tuscany, he was forced to resign His successor dispatched him to Paris on some unimportant mission, and thus ended Gioberti's political career, although his *Rinnovamento civile d'Italia* (1851) was the Bible of the revolution of 1859

From that period he devoted himself exclusively to literary pursuits in Paris until his death Gioberti aimed at the glory and aggrandizement of his country by means of the awakening of the national consciousness, but failed in farsightedness, and his influence as a political guide declined, but the depth of thought and strength of conviction in his various works entitle him to the standing which, as a writer, he enjoys Gioberti's remarkable gentleness in private intercourse bore no trace of the energetic force with which his writings propound an opinion or denounce an opponent His chief writings, besides the *Primato,* are *La teorica del soprannaturale* (1838), *L'Introduzione allo studio della filosofia* (1840), which sums up his philosophical system, best stated in the proposition, "Being creates existence", the *Lettre sur les doctrines philosophiques et politiques de M de Lamennais* (1841), the treatises *Del bello* (1841) and *Del buono* (1843), the *Prolegomeni al Primato* (1845), an open attack upon the Jesuits, whom he had covertly assailed in the *Primato; Il Gesuita moderno* (1847), a second attack upon the Jesuits, who had replied to his *Prolegomeni, Del rinnovamento civile d'Italia* (1851), advocating unity of the Italian states, national independence, and suppression of the temporal power of the Pope There appeared (1855–63) the *Riforma cattolica della Chiesa,* the *Filosofia della rivelazione,* a large part of his correspondence, and several other works Consult Berti, *Di Vincenzo Gioberti, riformatore politico e ministro* (Florence, 1881), Spaventa, *La filosofia di Gioberti* (Naples, 1863), Mauri, *Scritti biografici* (Florence, 1876), Zanichelli, "La giovinezza di Vincenzo Gioberti," in *Studi politici, etc* (Bologna, 1893) His whole philosophy is presented in extracts, organically arranged, in *V Gioberti, Nuova protologia,* ed by G Gentile, 2 vols (Bari, 1912)

GIOBERTINE (jō-bēr'tīn) **TINCTURE** A preparation for restoring writings or paintings which have from age become illegible In some cases the process has recovered documents which have been partially expunged and the parchment written over (See PALIMPSEST) The inventor of it was Giovanni Antonio Gioberti, an Italian chemist (1761–1834), a native of Piedmont, secretary of the Society of Agriculture at Turin, and professor in the university in that city

GIOCONDA, jō kōn'da, LA An opera by Ponchielli (q v), first produced in Milan, April 8, 1876, in the United States, Dec 20, 1883 (New York)

GIOCONDO, jō-kōn'dō, FRA GIOVANNI (c 1450–1515) An Italian architect, engineer, and antiquary, born at Verona He was a Franciscan friar, studied archæology in Rome, and made a remarkable collection of some 2000 ancient inscriptions which he presented to Lorenzo de' Medici He was the designer of the fortifications of Treviso and of works to prevent the silting up of the lagoon of Venice He was architect of Ferdinand, King of Naples (1489), and when Naples was taken by the French in 1495 he went with Charles VIII to France, where he is said to have designed the Pont Notre Dame, the Hôtel Dieu, Chambre des Comptes (neither of these two now standing), and other works After his return to Italy the Pope appointed him (1513) architect of St Peter's, he succeeded Bramante and was a colaborer with Raphael and Giuliano da San Gallo He is generally and with good reason believed to have designed the elegant Palazzo del Consiglio at Verona, erected most probably from his designs during his absence in France and considerably altered in modern times He was proficient in philosophy, theology, and classical literature, wrote notes on Cæsar's *Commentaries,* and published a critical edition of Vitruvius (1511)

GIOIA DEL COLLE, jō'ya dĕl kōl'lā A city in the Province of Bari delle Puglie, south Italy, 38 miles northwest of Taranto (Map Italy, F 4) It has a fine twelfth-century castle, built by the Hohenstaufen and recently restored It markets grain, wine, almonds, and wool In May and September important cattle fairs are held there Pop (commune), 1901, 21,721, 1911, 21,837

GIOIOSA JONICA, jō-yō'sa yō'nē-ka A city in the Province of Reggio di Calabria, south Italy, 10 miles northeast of Gerace, near the Ionian Sea Three miles below the town are the ruins of a Roman theatre and another ancient building called the Naviglio, whose nature and purpose are not clear (See *Notizie degli scavi,* 1883–84) It markets grain and olives Pop (commune), 1901, 10,247, 1911, 10,943

GIOJA, jō'ya, FLAVIO An Italian navigator of the fourteenth century, born at Pasitano, near Amalfi Three centuries later a legend—the elements of which can be analyzed—took form that he invented the compass, but he

merely contributed to perfect the instrument and to make it available for navigation Possibly he chose the fleur de-lis to mark North on the compass card, in honor of Charles of Anjou

GIOJA, MELCHIORRE (1767–1829) A famous Italian publicist, born at Piacenza He was educated for the priesthood, but later studied at Pavia, withdrew from the clergy, and in 1799 was appointed by the French government director of the statistical bureau at Milan Some of his chief works are *Sul commercio dei commestibili e care prezzo del vitto* (1804), *Nuovo prospetto delle scienza economica, Filosofia della statistica*

GIOJELLI DELLA MADONNA, jō-yĕl'lē dĕl'la ma-dōn'na, I It The Jewels of the Madonna) An opera by Wolf-Ferrari (q v), first produced in Berlin, Dec 23, 1911, in the United States, Jan 16 1912 (Chicago)

GIOLITTI, jō-lēt'tē, GIOVANNI (1843–) An Italian statesman. He was born at Mondovì in the Province of Cuneo and was educated at Turin After serving for eight years in a department of the Ministry of Finance, in which he was appointed chief inspector in 1874, he was elected to the Chamber of Deputies In 1889 he became Minister of the Treasury and, in the following year, Minister of Finance, which position he was soon afterward compelled to resign because of his policy of extreme economy After the fall of Rudinì, whose financial policy he had stoutly opposed, Giolitti became President of the Ministry, in May, 1892, and, although constantly antagonized by the Chamber, succeeded in introducing many needed reforms in favor of the lower classes In November, 1893, he was compelled to resign on account of the bank scandals and particularly on account of his friendly relations with Tanlongo, director of the Banca Romana, who had issued duplicate notes, had corrupted government officials, and whom Giolitti had appointed to the Senate Giolitti became Minister of the Interior in 1901, resigned in June, 1903, and in October formed a ministry of his own He resigned in March, 1905, but became Premier again in May, 1906, and held office until December, 1909 Sonnino's cabinet, which succeeded, resigned in March, 1911, and Giolitti again came into office, apparently only the stronger for his many defeats After his colonial budget had been vetoed in 1914 (March 4), he resigned (March 8), partly it seemed for strategic reasons

GIORDANI, jôr-da'nē, PIETRO (1774–1848). An Italian author, born at Piacenza, a stylist, and one of the several writers who helped the Italian language to throw off the French bondage of the preceding period He studied law, but in a moment of romantic despair joined the Benedictine Order After Marengo he fled from the cloister and finally became secretary of the Academy at Bologna His *Panegirico à Napoleon* caused him to be deprived of this post, at the restoration, in 1815, of the papal government The authority at Vienna, displeased by the liberality of the views he frankly expressed, persecuted him to the end of his life, throughout which he displayed a fine spirit of patriotism His writings are numerous consisting largely of critical essays, eulogies, memorial addresses, and pamphlets, and form part of the best Italian prose He was the first to recognize the genius of Leopardi. Giusti, Manzoni, Monti, Canova, and Capponi were also his friends The most valuable of his writings is the *Epistolario*, published with the *Opere*, ed by Gussalli and Vassali (4 vols, Milan, 1854–62) Consult Romani, *Della vita e delle opere di Pietro Giordani* (Mantua, 1868), and Della Giovanna, *Pietro Giordani e la sua dittatura letteraria* (Milan, 1882)

GIORDANO, jôr-da'nō, LUCA, called LUCA FA-PRESTO (1632–1705) An Italian painter, born in Naples He was the son of Antonio, an inferior painter, who continually urged him on at his work, saying, "Luca, work quickly," whence his nickname, "Fa-Presto" He painted with such facility that at the age of 13 the Viceroy of Naples placed him under the instruction of Giuseppe Ribera When still young, he went to Rome, where he made many copies of the pictures by the great masters There he studied under Pietro da Cortona, whom he assisted in his numerous contracts He afterward visited Venice and studied Titian and Paul Veronese, later, on his return to Naples, he was fitted to undertake important work Throughout his life he never lacked patronage In 1678 he executed an immense picture to commemorate the peace between France, Spain, and Holland In 1679 he was invited to Florence by the Grand Duke Cosimo III to decorate with frescoes the cupola of the Corsini Chapel, and in 1683 the Galleria Rocardi with a fresco of Olympus In 1690 he was invited to Spain by Charles II and appointed painter to the King and made Knight He painted some of his best frescoes in the chapel of San Lorenzo and on the grand staircase of the Escorial, the latter represented "The Battle of Saint-Quentin" and "The Taking of Montmorency" He also decorated other churches and palaces at Madrid and Toledo After the death of Charles II Giordano continued in the service of Philip V, and in 1702 he accompanied that monarch to Naples and was received with great enthusiasm So great had now become his power of painting rapidly that it is said he painted for the Jesuits a picture of "St Francis Xavier Baptizing the Indians," now in the Museum of Naples, in a day and a half In like manner he completed in 48 hours the frescoes of the Tesoro di San Martino, Naples, representing the "Story of Judith" One of his best frescoes is the "Cleansing of the Temple," in San Philippo a Girolamini, Naples

He painted an incredible number of pictures, all the chief galleries of Europe are well supplied with them Madrid has a great number, and there are many others at Dresden, Vienna, Naples, and Munich His earliest works are in the manner of Ribera, but by far the greater number are in a style formed under Pietro da Cortona He possessed ready invention and charm His color is harmonious and his brushwork good, but his pictures were negligently executed Among his best works, besides those mentioned above, are "Venus and Mars," in the Louvre the "Judgment of Paris," in Berlin, "David with the Head of Goliath" and "Lot and his Daughters," at Dresden, "Massacre of the Innocents," Munich, "The Archangel Michael," Vienna, etc Consult Bellori, *Le vite de pittori, scultori, ed architetti moderni* (Rome, 1728), and Riccardi-Vernaccia, *Galleria Riccardiana* (Florence, 1828)

GIORDANO, UMBERTO (1867–) An Italian composer, born at Foggia He received his musical education at the Conservatory of

Naples under Serrao, and while still a student attracted the attention of the publisher Sonzogno, who commissioned him to write his first opera, *Mala Vita* (1892) In 1894 *Regina Diaz* followed and failed, but two years later the success of *Andrea Chénier* carried the composer's fame beyond Italy *Fedora* in 1898 almost duplicated the success of its predecessor, while *Siberia* (1904) showed a decided falling off After a somewhat long period of silence he wrote *Mese Mariano* (1913), which shows a general advance over his preceding works, but still fell short of the great success of *Andrea Chénier* His latest opera, *Madame Sans Gêne*, had its world's première at the Metropolitan Opera House, New York, in 1915. Giordano began as an outright imitator of Mascagni, but soon turned away from the coarseness and brutality of the "veristic" school He combines real melodic invention with strong dramatic instinct

GIORGIO, jôr'jô, FRANCESCO DI (1439–1502) An Italian architect, engineer, sculptor, and painter, remarkable for his versatility, which makes him prominent among the artists of the Renaissance He was born in Siena, where, after 1463, he did constructive work, especially in connection with fortifications From 1478 he was in the service of the Duke of Urbino as military architect and engineer In 1480 he was commissioned to construct the model for the dome of the cathedral at Milan, executed in 1493 by Giovanni Antonio de Gessato The invention of mines at the siege of Naples in 1495 is attributed to him As a sculptor, he may be judged by the figures in the Loggia dei Nobili, and the angels bearing candelabra in the cathedral at Siena In painting he was a pupil of Vechietta, and imitated Fra Filippo Lippi, to which his graceful pictures in the Siena Gallery bear witness He wrote a *Trattato di architettura civile e militare*, ed by Cesare Saluzzo in 1841

GIORGIONE, jôr-jô'nâ (c 1478–1510). One of the greatest Venetian painters, the pioneer of the High Renaissance in Venice. Giorgione is the strong form of Giorgio, Venetian Zorzon (Zorzo, Zorzi), by which name he is known in contemporary documents He was born at Castelfranco, near Treviso There is no warrant for the seventeenth-century tradition of his descent from a local noble family, the Barbarelli Of his life little is known besides what Vasari relates that he was of humble origin and was brought up in Venice, that he was beautiful in person and of great social charm, a fine musician, singing perfectly to the lute, that he was an ardent lover, a typical representative of the gracious Venetian life of his day Although Vasari's narrative is based on later tradition, the picture which he presents is confirmed by the few other surviving sources The influence of his boyhood home may be seen in the idyllic landscape of his pictures He came early to Venice and was apprenticed to Giovanni Bellini (q v) Success came to him early, for in 1500 he received commissions from the Venetian state for the portraits of Doge Agostino Barbarigo and Condottiere Consalvo Farranti, in 1504 he was commissioned by Tuzio Costanzi, another condottiere, to paint the great altarpiece at Castelfranco, in 1507 he was employed in painting a large easel picture for the Hall of Audience in the Ducal Palace, and in 1507–08, in company with other artists, he decorated the façade of the Fondaco dei Tedeschi, after having previously decorated some half dozen others In September or October, 1510, he died of the plague in Venice

In such a short life he could have executed but few of the 150 paintings formerly attributed to him in the European galleries Of unquestioned authenticity, supported by documentary evidence, are the three following paintings (1) the altarpiece of the cathedral of Castelfranco, a "Madonna Enthroned between Saints Liberale and Francis," one of his earliest works, (2) "Gypsy and Soldier" (Venice, Palazzo Giovannelli), a beautiful landscape containing idealistic figures of a young man meeting a nude woman and child, (3) "Evander Showing Æneas the Site of Rome" (Vienna Museum)

Critics are, for the most part, agreed in ascribing to his early period two small richly colored pictures in the Uffizi, Florence "Moses and the Burning Bush" and "The Judgment of Solomon," both of his early period, and besides the "Madonna with Saints Anthony and Roch," catalogued as a Pordenone, in the Madrid Gallery Of a later period is the "Fête Champêtre," in the Louvre Of the many portraits ascribed to him, the "Knight of Malta," in the Uffizi, and the "Man in a White Costume," at Rovigo, are certainly genuine, the admirable "Young Man," in the Berlin Museum, and "Antonio Brocardo," in the gallery at Budapest, are probably also genuine

Among other works rightly ascribed to Giorgione are "Christ Bearing the Cross," now in the Gardner collection, Boston, and an earlier version in San Rocco, Venice, "Apollo and Daphne," in the Archbishop's Seminary, Venice, the "Three Ages of Man," in the Pitti Palace, Florence, and, especially, the "Sleeping Venus," in the Dresden Gallery, formerly considered a copy from Titian This last picture is, in our opinion, the most perfect representation of Venus in the art of the Italian Renaissance, and is the prototype of other representations of this subject by Venetian artists Morelli was the first to ascribe it to Giorgione, but he rejects the "Concert," in the Pitti Palace, usually ascribed to him, although it is a picture of the greatest charm Many other pictures are attributed to Giorgione in European galleries, and especially in the English, but most of these are doubtful The most charming of these is the "Shepherd Boy," in Hampton Court, which seems more likely the work of Torbido

Vasari long ago pointed out that Giorgione's position in Venetian painting was like that of Leonardo in Florentine, for he conducted it from the constraint and the detail of the early, to the freedom and mastery of the high, Renaissance Through him the new worldly spirit entered into Venetian painting Once religious and didactic, it now became worldly and poetic —an expression of the happy, gracious, and complete Venetian life of his day Under the guise of religious subjects he painted real genre, Venetian men and women in beautiful sunny landscapes, with no particular religious significance, but merely to express the mood or sentiment of the painter He made remarkable progress in the landscape, which he treats as of equal importance with the figures represented— idyllic in character and with the most remarkable effects of sunshine and atmosphere hitherto attained The color in his painting is bright, soft, and wondrously melting, the tone is golden, the light and shade subtle, and the line, though

not so distinct as Titian's is nevertheless correct His was unquestionably the most powerful influence upon Venetian painting in the sixteenth century Practically all important contemporaries followed his lead, even his master, the aged Bellini Among those most directly under his influence were Titian, Sebastian del Piombo, Palma Vecchio, Pordenone, Torbido, and Cariani

Bibliography The earliest authority to classify the works of Giorgione on a sound critical basis was Morelli (*Italian Painters*, London, 1892) Since then much progress has been made by Berenson, whose attributions seem to the present writer the soundest (*Venetian Painters of the Renaissance*, New York, 1909), by Justi, *Giorgione* (Leipzig, 1908), and Venturi, *Giorgione e il Giorgionismo* (Milan, 1913) The two last-named monographs publish also the historical sources of his life and works and contain excellent reproductions Other interesting monographs are Conti, *Giorgione* (Milan, 1894), Gronau, *Zorzon da Castelfranco* (Venice, 1894), Cook, *Giorgione* (London, 1900), Von Boehn, *Giorgione und Palma Vecchio* (Bielefeld, 1908)

GIOTTINO, jŏt-tē'nō (c 1324–57) An Italian painter, of the school of Giotto Much confusion exists concerning the painter designated under this name by Vasari It is thought by modern critics that the works of two different men—Maso, a pupil of Giotto, who worked before 1350, and Giotto di Stefano, who was active in the later fourteenth century—have been confounded under the name "Giottino" A Deposition," in the Uffizi, a "Crucifixion" and "Adoration," in the Strozzi Chapel at Santa Maria Novella, the legend of Constantine and Pope Sylvester at Santa Croce in Florence, are attributed to Giottino So have also been the frescoes of the Life of St Nicolas in the lower church at Assisi, and those in the church of Santa Chiara, Assisi The last two, however, are probably by Giotto di Stefano He stands very close to Giotto, had strong realistic tendencies, and partly gained in delicacy what he lost in force and originality Consult Vasari, *Lives of the Painters* (10 vols, New York, 1912), Crowe and Cavalcaselle, *History of Painting in Italy*, vol i (London, 1903), Thode, *Franz von Assisi* (Berlin, 1885), Siren, *Giottino und seine Stellung in der gleichzeitigen florentinischen Malerei* (Leipzig, 1908)

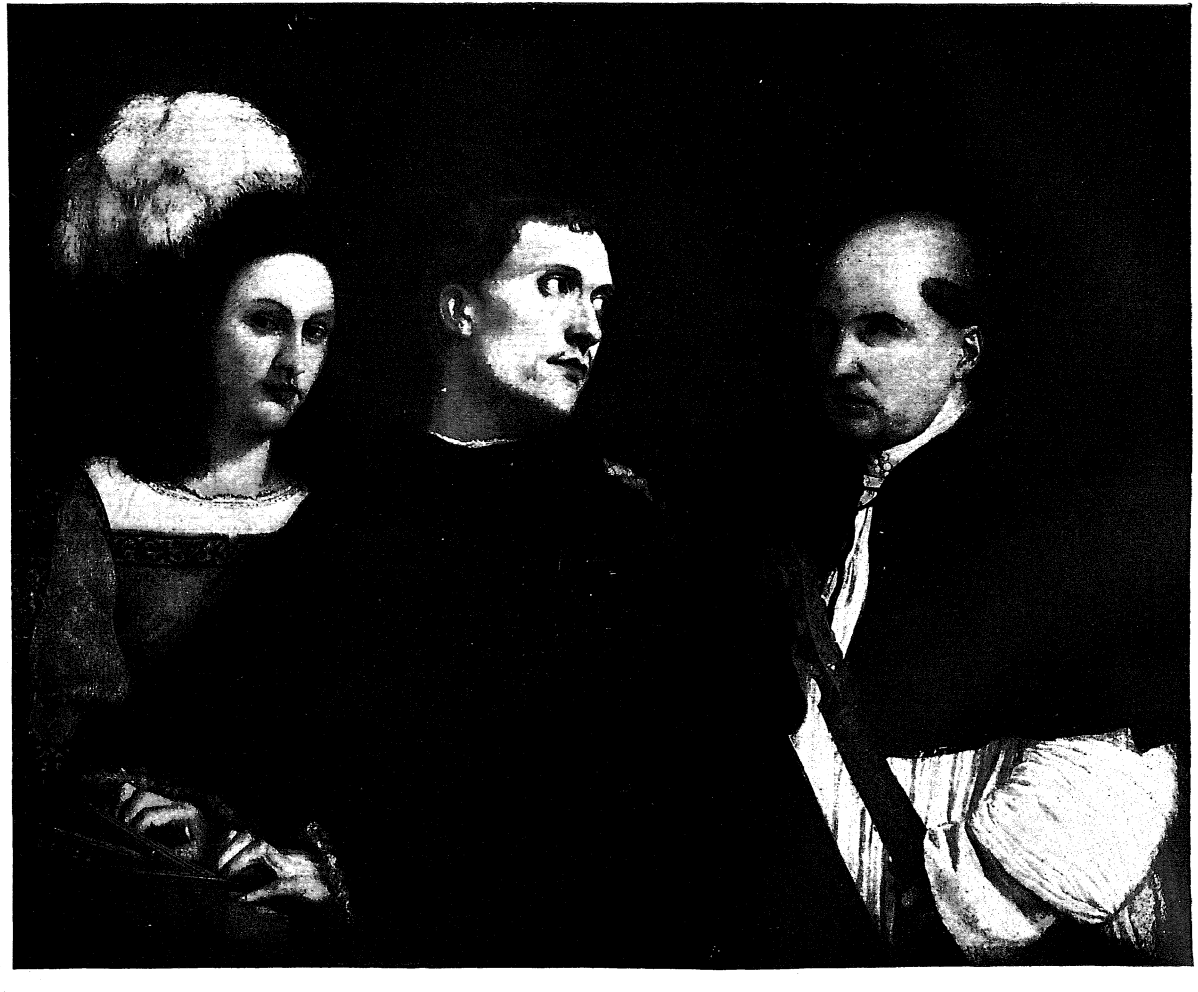
GIOTTO, jŏt'tō (Giotto di Bondone) (c 1276–1337) A Florentine painter, the greatest of Italy before the Renaissance, also a sculptor and architect He was born at Colle, near Vespignano, the son of a landed proprietor—not of a peasant, as was formerly supposed Two different legends explain his early study of painting Vasari, following Ghiberti's *Commentaries*, relates that while a shepherd boy he was seen by Cimabue (q v) drawing sheep on a slate, a commentator of Dante says that while apprenticed to a wool merchant he became attracted to Cimabue's studio and then entered it as this master's pupil (c 1280) But even the fact of his connection with Cimabue is now strongly contradicted It has become evident that his style is different from Cimabue's—which was a combination of the Byzantine and Roman schools—and that he was the pupil of the Roman school, developing its early Christian and classic side, and having close relation with his older contemporary, Pietro Cavallini (q v) He was influenced by the naturalistic art of Giovanni Pisano See Pisano

Giotto's earliest works are at Assisi, in the church of St Francis, where several stages in his early progress may be traced, from his intense and revolutionary but juvenile work depicting the life of St Francis, in the upper church, through the series of the "Life of Christ," in the lower church, completed in 1297 or 1298, to the masterly "Allegories of St Francis" Returned to Rome in 1298, Giotto painted the altarpiece for St Peter's (now in the sacristy), and designed the "Navicella" in mosaic, still surviving, much restored, in the vestibule of St Peter's, the frescoes on San John Lateran of which a fragment, "Boniface VIII Proclaiming the Jubilee," still survives At this time he is supposed to have painted the frescoes in the Palazzo del Podestà (now Museo Nazionale), Florence, from which, in 1841, the whitewash was partially removed, and which were thereupon ruinously "restored" They have attracted wide attention because in one of them the portrait of Dante appears between Corso Donati and Brunetto Latini (For illustration, see Dante) Giotto's authorship, however, has been denied with great show of reason

The next stage in his career is marked by the decoration in fresco of the entire Arena Chapel at Padua in 1303, in three rows of compositions illustrating the "Life of Christ," and the "Life of the Virgin," in 38 scenes, besides the "Last Judgment" on the inner façade, the scenes in the choir, and the "Allegories" of the dado The simplicity, dignity, and dramatic power of these compositions are beyond praise He reaches here the height of his genius After executing some almost destroyed works in Sant Antonio, Giotto returned to Florence and then to Assisi, where he painted the four famous allegorical frescoes in the vault of the lower church—the "Marriage of St Francis with Poverty," the "Triumph of Charity," the "Triumph of Obedience," and the "Glorification of St Francis" At some time before 1330 he executed the superb series of frescoes in the chapels at Santa Croce, of which only those in the Bardi and Peruzzi chapels survive in lamentable condition, but sufficiently to show that the religious fever recently gained had not been lost

The "Life of John the Evangelist" and the "Life of John the Baptist" (cleaned in 1841 and 1863) in the Peruzzi Chapel, representing his maturest style, are pronounced by many to be the master's greatest work, and the most fruitful inspiration of his successors even during the fifteenth century The "Ascension of St John" also is remarkable, as are the "Dance of Herodias' Daughter" and the "Birth of John the Baptist" The scenes in the Bardi Chapel are from the "Life of St Francis," from which even Ghirlandaio and Benedetto da Maiano drew inspiration On the invitation of King Robert of Naples, Giotto went to that city in 1330 He was named member of the King's household and assigned important commissions in the Castel Nuovo and Castel del Uovo and Santa Chiara, but no trace of these works survives During his stay, which lasted at least till 1332, he established a branch of his school After his return to Florence he was engaged rather in works of architecture and sculpture than painting

While Giotto's genius undoubtedly expressed itself in freest and most revolutionary fashion



GIORGIONE

"THE CONCERT," FROM THE PAINTING IN THE PITTI PALACE, FLORENCE

in frescoes, his panel pictures are both numerous and important An early example is the "Virgin and Child Enthroned, with Angels" in the Academy at Florence There are crucifixes at Santa Maria Novella, at the Ognissanti, and the Arena Chapel, Padua, important altarpieces at Santa Croce (Florence), in the gallery at Bologna, in the Louvre, a "Last Supper" in Munich, and a "Presentation of Christ in the Temple" in the Gardner collection, Boston

Giotto was also an architect, though probably not of the first rank, except as a designer He was made chief architect of the Florentine Cathedral in 1334, and his masterpiece of design, the Campanile, called Giotto's Tower, was then begun, and though left unfinished at his death, was probably carried out according to his plan, at least in the lower stories A design preserved in the Opera del Duomo at Siena may possibly be the original one by Giotto In it the lower story corresponds exactly with that of the Campanile, while the crowning spire harmonizes with what Vasari tells us was Giotto's original plan The Campanile is unique among church towers for its wealth of colored patterns and architectural detail and especially of sculptures It is a square tower, 84 meters high, in three stories Its reliefs and statues were from his designs, executed partly by Andrea Pisano and other masters, and are among the best works of Italian Gothic sculpture They are characteristic, allegorical, and philosophic themes of the creation and the moral qualities of man, and the various occupations of human life, artistic, scientific, intellectual, and material Giotto's share in the building of the cathedral is less clear

Giotto was from the first a popular figure in Florentine story His praises were sung by his friend Dante and by Petrarch, the historian Villani eulogizes him, while Boccaccio and Sacchetti relate interesting anecdotes From these accounts he seems to have been a typical Florentine, able, clever, and witty to an unusual degree His ode on "Poverty," which has been preserved, presents a striking contrast to his ideal representation of the subject in his paintings In painting his style was broad and simple, his coloring light and clear, his figures animated and full of expression, in contrast to the previous Byzantine style At his death his style had penetrated through a large part of Italy, and his followers gave him the compliment of almost slavish imitation The Giottesque style ruled Italy throughout the fourteenth century as no one man's style ever did before or afterward

Bibliography. The original sources are Ghiberti, *I commentari*, ed Schlosser (Berlin, 1914), Vasari, *Lives of the Painters* (10 vols, New York, 1912), Boccaccio, *Decameron*, vol vi, 5, Sacchetti, *Novelle* (Florence, 1886) Full modern studies will be found in Crowe and Cavalcaselle, *History of Painting in Italy* (London, 1903), Thode, "Giotto," in *Kunstlermonographien*, ed by Knackluss (Bielefeld, 1899), Zimmermann, *Giotto und die Kunst Italiens in Mittelalten* (Leipzig, 1899), and the monographs on Giotto by Perkins (London, 1902), Selincourt (ib, 1905), and Rintelen (Munich, 1912) Consult also. Ruskin (London, 1854–60), Frey, "Studien zu Giotto," in *Jahrbucher der konglich preussischen Kunstsammlungen*, vols vi, vii (Berlin, 1885–86); Janitscheck, *Die Kunstlehre Dantes und Giottos Kunst* (Leipzig, 1892), Berenson, *Florentine Painters of the Renaissance* (New York, 1909)

GIOVANITTI, jō'vä-nēt'tē, Arturo M (1884–) An American industrial agitator, born in the Abruzzi, Italy He emigrated to the United States in 1901, studied in Union Theological Seminary, New York City, and worked in Presbyterian missions With Joseph J Ettor (q v) he led the Lawrence (Mass) textile mill strikers in 1912 The authorities of Lawrence had these two leaders arrested in January upon the charge of inciting to a riot leading to loss of life, they based their action upon a statute fallen into desuetude Ettor and Giovanitti were kept in jail for more than 10 months before they were at last tried and acquitted in November, 1912 Their imprisonment occasioned a nationwide agitation for free speech by the Industrial Workers of the World, the Socialists, and other more or less radical elements, and at the time of the trial a 24-hour protest strike was called in Lawrence "The Cage," a poem by Giovanitti published in the *Atlantic Monthly*, was inspired by the idea of "sixteenth-century courts trying to solve twentieth-century problems" A volume of his verse, *Arrows in the Gale*, was published in 1914

GIOVANNI, jō-van'nē, Demenico di. See Burchiello, Domenico

GIOVANNI, Francesco Poggio Bracciolini See Poggio Bracciolini, Giovanni Francesco

GIOVANNI DA BOLOGNA See Bologna

GIOVANNI PISANO. See Pisano, Giovanni

GIOVENAZZO, Duke of See Cellamare

GIOVINAZZO, jō'vē-nat'sō. A city on the Adriatic, in the Province of Bari delle Puglie, Italy, 12 miles northwest of the city of Bari It has bastioned walls, a thirteenth-century Greek-Norman cathedral, a theatre, a technical school, and a gymnasium It markets wine, olives, almonds, and building stone, and manufactures brandy and fish nets Pop (commune), 1901, 11,245, 1911, 10,727

GIOVIO, jō'vē-ō, Paolo also known by the Latin form of his name, Jovius (1483–1552) A noted Italian biographer and historian He was born at Como and studied philosophy and medicine at Padua and at Pavia, but finally turned to literature, after practicing medicine at Rome His excellent Latin style brought him to the notice of Leo X, who in turn recommended him to the kindness of Cardinal Giulio de' Medici, afterward Clement VII Clement showered favors on him and as a compensation for the loss of all his property, incurred in the sack of Rome, 1527, made him, in 1528, Bishop of Nocera in Naples Clement's successor, Paul III, looked with disfavor on the worldly, pleasure-loving Bishop, and Giovio was compelled to retire to his magnificent villa on Lake Como, where he spent his time in the company of fine pictures and clever men He was a contemporary of Machiavelli and Varchi He frequently visited, however, the various Italian courts, where his genius and esprit were greatly admired. He died at Florence, of the gout, and was buried in the church of San Lorenzo Giovio was an excellent type of the ecclesiastical pagan of the Italian Renaissance As an historian, he is not to be depended on, being exceedingly incorrect in his facts and shamelessly venal The following works, however, deserve mention *Historiorum sui Temporis Libri XLV* (Florence, 1550–52), *Illustrium*

Virorum Vitæ (ib, 1549–57) Consult Muntz, *Le musée de portraits de Paul Jove* (Paris, 1901)

GIPPSLAND, gĭps'lănd The southeast district of Victoria (q v), Australia It is composed largely of mountain and forest land with great mineral deposits Its valleys are fertile

GIPSIES See GYPSIES

GIRAFFE, jĭ-răf' (formerly also *jaraff*, from Fr *giraffe*, from Sp, Portug *girafa*, from Ar *zarāfat*, giraffe, from *zerafa*, to walk slowly), or CAMELOPARD The tallest of quadrupeds (*Giraffa camelopardalis*), constituting, with the okapi, a distinct family of ruminants, Giraffidæ. It is a native of Africa, formerly extensively diffused from Nubia to the Cape of Good Hope, though apparently nowhere abundant It is now nearly extinct south of the Zambezi River and east of the Kalahari Desert, and numerous only in the remote interior, where it frequents arid plains It occurs generally in small herds of from 5 to 40 and feeds on the leaves and small branches of trees Its general aspect is remarkable because of the height of the fore parts and great elongation of the neck, the head being sometimes 18 feet from the ground The number of vertebræ in the neck is seven, no greater than in other quadrupeds, and the neck has no extraordinary flexibility, but its length is produced by an elongation, elsewhere unknown, of each vertebra The body is short, and the back slopes from the shoulder to the tail, but the greater height of the fore parts is not owing to the length of the forelegs, which are not really longer than the hind legs, but to processes of the vertebræ which form a basis for the muscular support of the neck and head and make a hump on the shoulders The articulation of the skull to the neck is such that the head can easily be thrown back until it is in the same line with the neck, thus giving the animal additional power of reaching its appropriate food The skull has empty cavities, which give lightness to the head, along with sufficient extent of surface for the insertion of the ligament which supports it The legs are long and slender, the feet have cloven hoofs, but are destitute of small lateral toes The head is long, the upper lip entire, projecting far beyond the nostrils, and endowed with considerable muscular power The tongue is remarkably capable of elongation and can be thrust far out of the mouth and employed to grasp and take up very small objects, and by it and the mobile lips the animal obtains its food, which consists almost wholly of the leaves and twigs of mimosa trees The dentition of the giraffe is bovine, but the upper jaw has no canine teeth The head is furnished with two remarkable protuberances between the ears, generally described as "horns," and consisting of a bone united to the skull by an obvious suture, permanent, covered with skin and hair, and terminated by long hard bristles. The nearest analogue is the horn core of the pronghorn The ears are moderately long, the tail is long and terminates in a tuft of long hair that nearly reaches the ground There is a callosity on the breast The neck has a very short mane. The hair is short and smooth, reddish white, marked by numerous dark rusty spots

The eye of the giraffe is very large, lustrous, and commands a wide angle of vision, and the nostrils have a muscle by which they can be closed against blowing sand. It is an inoffensive animal and generally seeks safety in immediate flight, although it is capable of making a stout resistance, and fights by kicking with its hind legs, discharging a storm of kicks with extraordinary rapidity It is not easily overtaken even by a fleet horse and has greatly the advantage of a horse on uneven and broken ground Its pace is a gallop, the hind legs reaching ahead and astride of the forefeet at every leap Wise hunters who attempt to pursue giraffes at all on horseback try to push them so hard at first as to get them 'blown," after which they can drive them steadily towards camp, otherwise the giraffe may gallop for miles They are exceedingly keen of smell and hearing, see well, and are game that tax the skill of good sportsmen, yet great numbers have recently been killed for their hides

The giraffe was known to the ancients and was exhibited in Roman spectacles Representations of it appear among Egyptian antiquities It has been supposed to be the *zemer* of the Jews, translated *chamois* in the English Bible (Deut xiv 5) Giraffes are among the rarest and most valuable animals in captivity, although they will thrive well with proper care In 1892 the last giraffe in the gardens of the London Zoological Society died, and for the first time since 1836 the animal was not on exhibition in London, the secretary of the society reported that he saw no immediate prospect of obtaining a living specimen They have bred in Europe

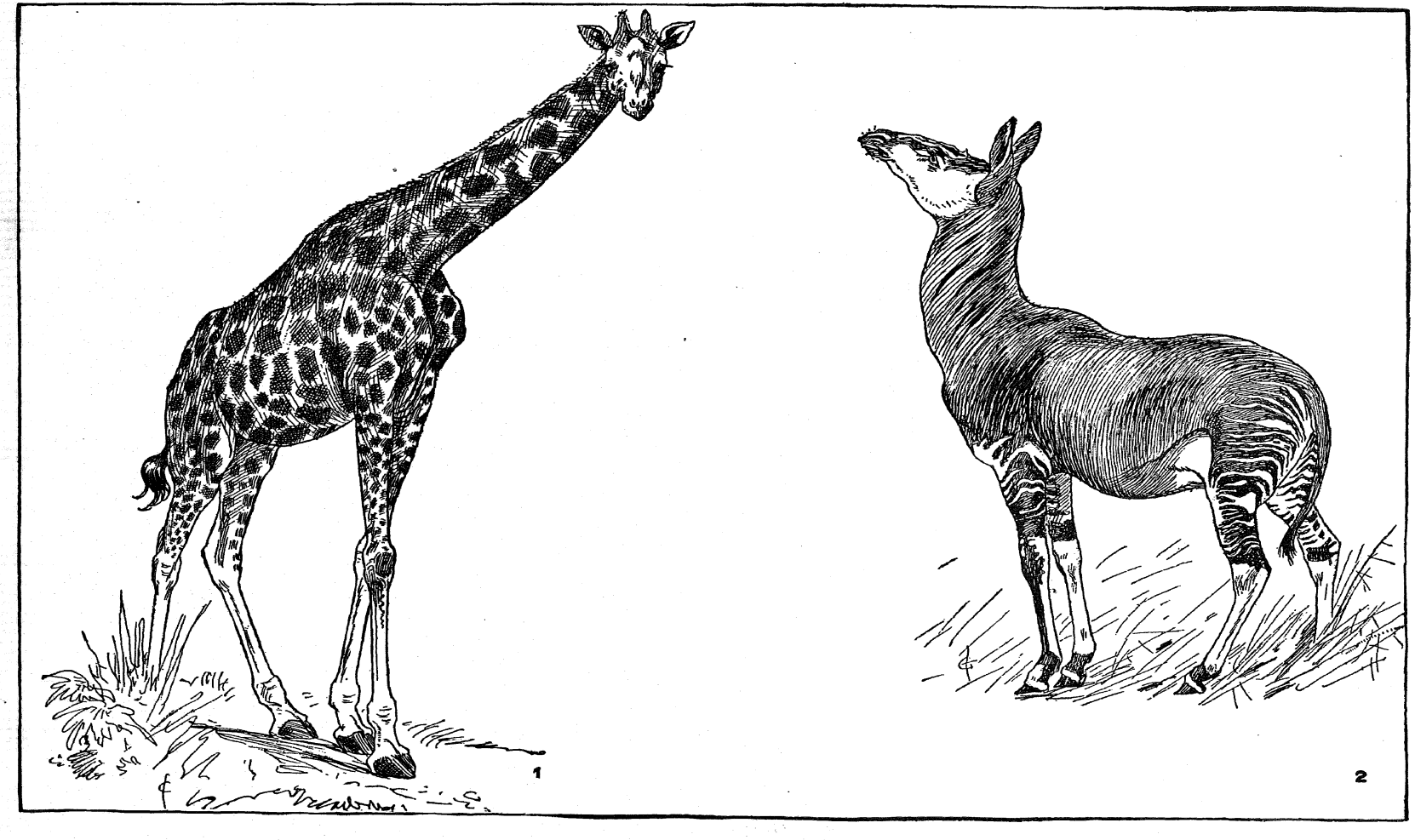
Besides the typical form, a dozen or more subspecies have been recognized, while the Somali giraffe, *Giraffa reticulata*, is usually considered a distinct species

Fossil Forms The modern giraffe is the lone relic of the family Giraffidæ that was rather widely distributed during later Tertiary times The origin of the family is not known, though it seems to have split from the other ungulates at a late date and to be closely allied to the deers and oxen Fragmentary skeletons like that of the modern giraffe, perhaps of the same species, are found in the Pliocene deposits of Europe and India The earliest forms, found in the Pliocene beds of India, Persia, and southern Europe, have more heavily built skeletons, with shorter necks and larger horns, than does the modern species, and the horns, of which there are often two pairs, are found on the skull of the male only The principal fossil genera are *Samotherium* and *Sivatherium* (qq v)

The best accounts of giraffes are found in the writings of African sportsmen travelers, such as the books of Sir W C Harris, Gordon Cumming, C J Andersson, Sir Samuel Baker, H A Bryden, and especially of H C Selous For a recent review of the known forms, consult Lydekker, *Game Animals of Africa* (London, 1908), and Rothschild and Neuville, *Annales des Sciences Naturelles Zoologie*, (9) xiii (Paris, 1911) Consult also authorities mentioned under ANTELOPE, so far as they relate to Africa, and see Plate of GIRAFFE AND OKAPI

GIRALDA, hē-ral'da (from Sp *girar*, to turn) A square tower, now serving as the belfry of the cathedral of Seville, Spain, built between 1184 and 1196 as a minaret of a mosque By some authorities its design is attributed to the Arab mathematician El Guebr The tower measures 50 feet at its base and tapers slightly towards the top of the square portion,

GIRAFFE AND OKAPI



1. GIRAFFE (Giraffa camelopardalis)

2. OKAPI (Ocapia johnstoni).

250 feet above, which is reached by an inclined plane without stairs It is richly decorated in Moorish style From this top rises a square Renaissance belfry, 100 feet in height, dating from 1568, terminating in a small dome The latter is surmounted by a statue of Faith, which in spite of its great weight is adjusted to turn freely with the wind and gives the tower its name Consult J A Cean Bermúdez *Descripción artística de la catedral de Seville* (Sevilla, 1863), and G E Street, *Gothic Architecture in Spain* (2 vols, New York, 1914) See Plate of SEVILLE

GIRALDÈS, zhē'ral'dās', CARDOZO JOACHIM ALBIN (1808–75) A French surgeon, born at Oporto, Portugal, and educated in Paris He was for many years surgeon of the Foundlings' Hospital, Paris, and (1848–54) surgeon of the Central Bureau of Hospitals An accident compelled him to give up active practice One of the constituent parts of the human testicle bears his name His contributions to medical science include *Des luxations de la mâchoire* (1844), *Du traitement des anévrysmes poplités par la compression* (1845), *Recherches sur les kystes muqueux du sinus maxillaire* (2d ed, 1860), *Leçons cliniques sur les maladies chirurgicales des enfants* (1869)

GIRALDI, jē-ral'dē, GIOVANNI BATTISTA, surnamed CINZIO, or CYNTHIUS (1504–73) An Italian author, born at Ferrara He was educated at the university there, where in 1525 he was made professor of natural philosophy He became Secretary of State under the dukes Ercole d'Este II and Alfonso II of Ferrara As a member of the Accademia delle Affidati, he took the name of Cinzio He wrote a number of tragedies, the best known of which is *Il Orbecche* (1541), and *Gli hecatommiti* (1565), a hundred tales, translated into French as *Les cents excellentes nouvelles* (1583) by G Chappuys The plots of Shakespeare's *Measure for Measure* and *Othello* can be traced to him His plays show the influence of Aristotle and Seneca, but he applied their theories with great freedom Consult Bilancini, *Giraldi e la tragedia ital nel secolo XVI* (Aquila, 1890), Ghilini, *Teatro d'uomini letterati*, vol 1, F Beneducci, *Il Giraldi e l'epica nel cinquecento* (Bra, 1896)

GIRAL'DUS, or **GERALD, DE BAR'RI** (?1146–?1220) An English ecclesiastic and chronicler, best known as Giraldus Cambrensis He was born in Pembrokeshire of a noble Norman family and was educated by his uncle, who was Bishop of St David's During his youth he thrice visited Paris, studying and lecturing at the university there He took holy orders, probably in 1172, and was soon afterward appointed Archdeacon of Brecknock, in which capacity he showed himself an ardent champion of ecclesiastical privilege and a strict disciplinarian On the death of his uncle, in 1176, Giraldus was chosen Bishop by the chapter of St David's, but failed of confirmation by the King and retired to the University of Paris, where he resumed the study of canon law and theology He returned to England in 1180, and in 1184 he visited Ireland as preceptor to John, the youngest son of Henry II As a result of this trip, he wrote his *Expugnatio Hibernica* and *Topographia Hibernica*, a description of Ireland, which still possesses great antiquarian value, though open to criticism in many respects A tour of Wales which he made in 1188 in the company of Baldwin, Archbishop of Canterbury, resulted in the writing of the *Itinerarium Cambriæ* About this time Giraldus was offered the bishoprics of Llandaff and Bangor, but refused to accept either, in expectation probably of succeeding to the see of St David's, on which his heart was set In 1198 that office fell vacant, and Giraldus was again elected by the chapter, but only to be rejected again by the King, the chief reason for his failure being, perhaps, his Welsh family connections After a contest lasting five years and repeated appeals to the Pope, Giraldus accepted defeat, resigned his office of archdeacon, and devoted himself henceforth to study Giraldus' writings, though disfigured by credulity and marked, in the personal narratives with which they abound, by excessive vanity, are of great value as materials for the political history and the social condition of the age and the country which they describe His works are in the *Rolls Series* (8 vols, 1861–91)—vols i–iv by Brewer vols v–vii by Dimock, vol viii by Warner The *Topographia Hibernica*, *Expugnatio Hibernica*, *Itinerarium Cambriæ*, and *Descriptio Cambriæ* are published in one volume in "Bohn's Antiquarian Library" Consult Hoare's translation of the *Itinerary through Wales* (2 vols, London, 1806), Owen, *Gerald the Welshman* (ib, 1889), Gross, *Sources and Literature of English History* (ib, 1900)

GIRANDOLA, jē-ran'dō-la A splendid display of fireworks formerly given at the castle of Sant' Angelo, Rome, on the coronation of a new Pope and at the feast of St Peter, June 29 It was later transferred to the Pincian Hill and given on the first Sunday in June

GIRANDOLE, jē-rán'dō-lā, BERNARDO DELLA See BUONTALENTI, BERNARDO

GIRARD, jī-rard' A city in Russell Co, Ala, opposite Columbus, Ga, on the Chattahoochee River, and on the Central of Georgia Railroad (Map Alabama, D 3) It is in a cotton growing region and has a cotton mill, a distillery, several wholesale liquor houses, and a concrete plant Pop, 1900, 3840, 1910, 4214

GIRARD A city and the county seat of Crawford Co, Kans, 26 miles south by west of Fort Scott, on the St Louis and San Francisco, and the Atchison, Topeka, and Santa Fe railroads (Map Kansas, H 7) It is the centre of a fertile agricultural and stock-raising region, near extensive bituminous coal fields, and has breakfast-food factories, a foundry, and stove works, flour mills, brickyards, and other industrial establishments The "*Appeal to Reason*" is published here The water works and electric-light plant are owned by the municipality Girard has adopted the commission form of government Pop, 1900, 2473, 1910, 2446

GIRARD A village in Trumbull Co, Ohio, 5 miles north of Youngstown, on the Mahoning River, and on the Erie, Baltimore, and Ohio, and the Pennsylvania railroads (Map Ohio, J 3) It has manufactories of iron and steel, leather, and chewing gum Pop, 1900, 2630, 1910, 3736

GIRARD, CHARLES (1822–95) An American naturalist, born at Mulhausen, Alsace He was a pupil and assistant of Louis Agassiz at Neuchâtel and from 1847 to 1850 an associate in scientific investigations in the United States In 1850–59 he was connected with the Smithsonian Institution With Prof S F Baird of the Institution, he made extensive studies of reptiles and wrote the article "Reptiles" in Stanbury's *Exploration and Survey of the Great Salt Lake*

of Utah (1853), and a *Catalogue of North American Reptiles in the Museum of the Smithsonian Institution Part I, Serpents* (1853) Among his writings are *Herpetology of the United States Exploring Expedition under the Command of Captain Wilkes* (1858) and a "Report upon Fishes" for Emory's *Survey of the United States and Mexican Boundary* (1859)

GIRARD, zhē'rär', FIRMIN (1838–) A French genre painter He was born at Poncin (Ain), and studied at the Ecole des Beaux-Arts under Gleyre His works are painted anecdotes, such as "The Fiancées," "The First Communion," "After the Ball," "The Betrothal," "A Wedding in the Last Century", "A Death-Bed Wedding" (Bruges Museum), "A Street in Paris" (Helsingsfors), "Picardy Interior" (1908), "Waffles" (1909) They are freshly and truthfully executed in brilliant colors and are minutely finished

GIRARD, JEAN BAPTISTE, "Le Père Girard" (1765–1850) A Swiss educator, born at Fribourg He entered the Franciscan Order at 16 Although he had done some teaching, he did not begin his definite work in education until 1798, when he published a *Projet d'éducation pour toute l'Helvétie* In 1805 he became director of the primary schools at Fribourg, and there he remained until 1823 His ideas were considered too liberal, and the Jesuits were more powerful than the Franciscans, so 'Le Père Girard" was compelled to give up his school Until 1834 he taught philosophy at Lucerne, then he came back to Fribourg and lived in what one of his biographers calls "a laborious retirement" Here he wrote his *Enseignement regulier de la langue maternelle* (1844–46), which was awarded a prize by the French Institute Villemain, who praises him highly, sums up his theory of teaching in these words "The only, the really popular school is one in which all the elements of study serve in the cultivation of the mind, and where the child is led himself by the things he learns and by the way in which he learns them" Girard was himself a grammarian of the first order, but he said, instead of "a grammar of words," let us have "a grammar of ideas" His influence has grown and still grows in Switzerland, France, and Italy, and is felt in much of the improvement recently made in the teaching in the elementary French schools A critical judgment places him next to Pestalozzi among Swiss educators

GIRARD, JULES AUGUSTIN (1825–1902) A French classical scholar, born in Paris, of a family of engravers He studied at the Ecole Normale and was professor of rhetoric at the College of Vendôme and then at the Lyceum of Lille and in 1874 became professor of Greek poetry in the Faculty of Letters of Paris He wrote *Essai sur Thucydide* (1860, revised, 1884), crowned by the French Academy, *Le sentiment religieux en Grèce* (1869, 2d ed, 1879), *Etudes sur l'éloquence attique* (1874, 2d ed, 1884), *Etudes sur la poésie grecque* (1884), a French version of Theocritus (1888), and many contributions to the *Revue des Deux Mondes* In 1873 he was elected a member of the Academy of Inscriptions Consult the memoir in *Comptes rendus Bulletin* of that Academy for 1902, by Valois Noel

GIRARD, MARC AMABLE (1822–92). A Canadian statesman He was born at Varennes, Province of Quebec, was educated at St Hyacinthe College, and was afterward called to the bar of Lower Canada When the Legislative Council of Canada became an elective body, Girard was an unsuccessful candidate for it in 1858, and in 1862 he was also an unsuccessful Conservative candidate for the Legislative Assembly of Canada Later he went to the Canadian Northwest and was called to the Manitoba bar in 1871 He was Provincial Treasurer in 1870–72, Premier in 1874, and between 1879 and 1883 held the offices of Provincial Secretary Minister of Agriculture, and President of the Council He was afterward appointed to the Dominion Senate

GIRARD, NOEL JULES (1816–) A French sculptor, born in Paris He was a pupil of David d'Angers and Petitot at the Ecole des Beaux-Arts, and first exhibited at the Salon in 1849 His "Vintager Pressing the Grape" (1852) was bought by the government, and his "Comedy" and "Drama" were accepted as the pediment for the side façade of the Paris Opéra Others of his works are "La Rochefoucauld" (Louvre), "Charity" and "Science" (Hospital of Lariboisière), 'St John" and "St Joseph" (church of St Sulpice, Paris)

GIRARD, PAUL FRÉDÉRIC (1852–) A French jurist, born in Guingamp, Côtes-du-Nord, and educated at Paris and Rennes He was professor of law at Montpellier in 1880–88 and at Paris in 1888–93 He was one of the most important writers of his day on Roman law and received honorary degrees from the universities of Breslau and Heidelberg He translated into French (1887–96) Mommsen's *Romisches Staatsrecht*, edited *Textes de droit romain annotés* (1890–1912), and wrote a valuable *Manuel de droit romain* (1896, 5th ed, 1911, translated into German, 1908), *Histoire de l'organisation judiciaire des Romains* (1901), *Melanges de droit romain* (1912)

GIRARD, PHILIPPE HENRI DE (1775–1845). A French mechanician and inventor He was born at Lourmarin, Vaucluse, and manifested a strong aptitude for mechanical invention, also showing a fondness for botany, painting, and literature Forced by the Revolution to leave France, he painted at Port Mahôn, Minorca, and then was a soap-maker at Leghorn Returning after the fall of Robespierre, he became professor of chemistry and of natural history at Nice. About 1800 he went to Paris and there established a soap manufactory Girard invented and patented a successful flax-spinning machine, for which a reward of 1,000,000 francs had been offered by Napoleon In 1813 he established a flax mill at Paris and another at Charonne, in both of which he made use of his machine, but although he was declared to have earned the reward offered, the fall of Napoleon in 1815 left the decree unfulfilled Girard now on this account becoming involved in serious money difficulties, he engaged in manufacturing flax in Austria and Poland, and in steam navigation on the Danube until 1825 In that year he became attached to the Russian government to promote the manufacture of flax and later was appointed chief engineer of the mines of Poland In 1844 he returned to France and exhibited at an industrial exposition a large number of his inventions

GIRARD, PIERRE SIMON (1765–1836) A French civil engineer, born at Caen At the age of 24 he was engaged as engineer in the construction of roads and bridges and upon his return from the Egyptian campaign in 1802 was

appointed chief of that department He built the canal from the Ourcq River to Paris (1802–20), and in 1819 was director of the department of gaslight illumination in that city, in which capacity his researches on the then comparatively new illuminating agent were highly important His principal writings include *Traité analytique de la résistance des solides* (1798), *Rapport des ponts et chaussées sur le projet général du canal de l'Ourcq* (1803), *Mémoire sur le canal de l'Ourcq et la distribution de ses eaux* (1831)

GIRARD, jĭ-rärd′, STEPHEN (1750–1831) An American merchant and philanthropist He was born at Bordeaux, France, the son of a sea captain, became a sailor in 1764, and at the age of 23 was captain and part owner of a ship engaged in the West Indian and American coasting trade In 1776 he settled in Philadelphia, but continued in the coasting trade until stopped by the outbreak of the Revolutionary War Espousing the cause of the Colonies, he remained in America, dealt in a small way in army supplies, and in 1780 again embarked in the West Indian trade, this time on a more extensive scale, and in a few years, by a succession of lucky ventures, had accumulated a considerable fortune In 1810 he became largely interested in the first United States Bank and in 1812, upon the lapsing of its charter, purchased the greater part of its stock, and its building He retained the old officers, only renaming it "The Bank of Stephen Girard," succeeded to much of the old bank's business, and made it one of the soundest and most successful financial institutions in America During the War of 1812 he was the chief financial support of the government, advancing it large sums to enable it to continue military operations, and in 1814 took up practically an entire loan of $5,000,000, after subscribers had been sought in vain On the rechartering of the second United States Bank in 1816, he became one of its principal stockholders and a director and exercised a dominant control over its policy for many years Upon his death he left almost his entire fortune of $7,500,000 in public benefactions, chief of which was Girard College, in the regulations for the control and management of which he incorporated his ideas as to freedom of thought and religious belief. Girard's personality was forbidding and his personal appearance most unattractive Penurious and almost miserly in small affairs, a close and shrewd business man, and a hard taskmaster, he was, nevertheless, generous and openhanded in his benefactions even during his life and self-sacrificing and public-spirited to a degree, as his personal services to the people of Philadelphia, when that city was ravaged by a yellow-fever epidemic in 1793, showed Consult Ingram, *Life and Character of Stephen Girard* (Philadelphia, 1884), and a sketch in *Semicentennial of Girard College* (ib, 1898)

GIRARD COLLEGE. An institution for the education of orphans, founded in 1848 at Philadelphia, Pa, under the will of Stephen Girard (q v). Mr Girard died Dec 26, 1831, bequeathing the residue of his estate, valued at $5,260,000, in trust for the establishment of an institution for the education and maintenance of "poor white male orphans" The age of admission was fixed by Mr Girard at between 6 and 10, and the age of leaving at between 14 and 18, at which time students were to be bound out in the arts and trades Applicants for admission were to be preferred, first as coming from Philadelphia, second from Pennsylvania, third from New York, and fourth from New Orleans The courses of study were to be in the main practical, insistence being laid upon "facts and things rather than words or signs" The principles of "pure morality" were to be taught, but the inculcation of religious doctrine in a denominational sense was forbidden, and—most famous clause of a famous will—ministers and ecclesiastics of every sect were prohibited from holding office in the college or entering its premises upon any pretext whatsoever The exclusion of clergymen has been interpreted as being hostile to religious teaching The founder said, in express terms, that the provision for the exclusion of clergymen was introduced so that the minds of the boys who were being reared by the institution might be kept free from the confusion of denominational controversies, and was followed in the will by a statement that it was not to be interpreted as being a "reflection upon any sect or person whatsoever" The assembling of the college for chapel service, of which a part invariably is Scripture reading and prayer, is a daily practice On Sunday two chapel services are held, and at these services addresses are delivered either by some member of the official staff of the college or by some visiting layman

Preliminary action looking to the due execution of Mr Girard's will was taken by the Philadelphia city councils in 1832, a board of trustees was elected in 1833, and in the same year the corner stone of the main building was laid This building, erected in the form of a Greek temple, was completed in 1847 at a cost of nearly $2,000,000 In the meantime suit had been brought by Mr Girard's heirs to have his will set aside, and the case was not decided until 1844, when the United States Supreme Court, notwithstanding the argument of Daniel Webster for the plaintiffs, held the will to be valid In 1848 the college was formally organized with 100 pupils and 17 instructors and officers, the income at that time being about $118,000 annually In addition to the main building there are some 20 other buildings for the purposes of the institution, among them being a chapel, school buildings, dormitories, dining hall, infirmary, mechanical school building, etc Forty acres are inclosed for the use of the college by a substantial stone wall, 10 feet high The present normal capacity of the college is 1520 pupils Through wise investment and careful management the endowment of the college has increased to about $29,000,000, exclusive of the plant

Mr Girard provided that the care of his college should be assumed by the mayor, the aldermen, and the citizens of Philadelphia, and their agents, the then corporate title of the city In the earlier years the board of control was chosen by the councils of the city, and with frequent changes, divisions in the board, and the uncertainty of policy because of these changes, it was found not to be to the interest of the college, and, by act of the Legislature, approved June 30, 1869, the present board of directors of city trusts succeeded the earlier plan of control This board consists of 12 directors (chosen for life by the board of judges of the courts of Common Pleas of Philadelphia) and the mayor of the city, and the president of the select councils, ex officio The board manages not only Girard College, but the Girard estate, parts of which

are extended to other purposes, and numerous other bequests The principal departments of the college are admission and discharge, infirmary and health, domestic or matron's department, steward's department, household and playgrounds, and education As an educational institution, Girard College is composed of three schools—a primary school of four years, a grammar school of three years, and a high school of four years Preparation is given for the following mechanical pursuits trade drawing, carpentry and woodworking, machine-shop practice, electrical construction, foundry, forge practice, and smithing, and printing On the commercial side instruction is given in bookkeeping and office practice, commercial law and customs of business, and shorthand and typewriting The president in 1914 was Cheesman A Herrick

GIRARDIN, zhē'rar'dăn', EMILE DE (1802–81) A French legislator and publicist He was born in Paris, an illegitimate son of Alexander, Count Girardin In 1831 he married Delphine Gay (q.v), a well-known writer. After engaging in various journalistic enterprises and being inspector of fine arts in the Martignac Ministry, he was elected in 1834 a member of the Chamber of Deputies, in which he served for many years As the founder and editor of the conservative and Royalist organ *La Presse*, he secured the patronage of the court, and though compelled to resign the editorship during his term in the Legislative Chamber, he again conducted it from 1851 to 1856 and from 1862 to 1866, when he sold it to the banking house of Millaud & Co. In 1867 he acquired for 500,000 francs the journal *La Liberté*, in which he served the interests of the Liberal Empire, and which he converted into a violent anti-Prussian paper This was followed in 1871 by *L'Union Française*, and then he bought *Le Petit Journal* to support Thiers. After conducting various other papers, such as the *Journal Officiel* and *La France* (after 1874), he retired in 1881, with a fortune estimated at 1,000,000 francs As a journalist, he was in some respects the chief leader of his day The history of his origin and early childhood is recounted in the first novel published by him, and entitled *Emile* (1827) His other writings include *La fille du millionnaire*, a comedy in three acts (1858), *Etudes politiques* (2d ed, 1849), *De l'instruction publique en France* (2d ed, 1842), *La politique universelle, decrets de l'avenir* (4th ed, 1854); *L'Homme et la femme* (1872), *Le supplice d'une femme*, a comedy (1865), frequently republished and highly successful

GIRARDIN, JEAN PIERRE LOUIS (1803–84). A French chemist, born in Paris He became professor of chemistry at Rouen in 1828 and at Lille in 1858, and was appointed rector of the academy at Clermont-Ferrand in 1868 He devoted himself especially to the applications of chemistry to art, industry, and agriculture, and published *Considérations générales sur les volcans* (1830), *Du sol arable* (1842), *Des fumiers et autres engrais animaux* (1875), *Traité élémentaire d'agriculture* (1874), *Chimie générale et appliquée* (1868–69).

GIRARDIN, MADAME DE See GAY, DELPHINE

GIRARDIN, SAINT-MARC See SAINT-MARC GIRARDIN, FRANÇOIS AUGUSTE

GIRARDON, zhē'rar'dōn', FRANÇOIS (1628–1715) A leading French sculptor of the court of Louis XIV He was born at Troyes, March 17, 1628, the son of a bronze founder, Nicolas Girardon As a boy, he entered the service of one Baudesson, a wood carver and furniture maker, whose son was a painter of some importance Although intending to become a sculptor, Girardon learned to paint and at the age of 15 decorated a chapel of Ste Julie in Troyes There is some good work of the Renaissance in Troyes, which was a source of inspiration to the sculptor His first work in sculpture was a statue of the Virgin in his native city At this time the Chancellor Séguier undertook certain improvements at his château of Saint-Liébaut Baudesson, who was employed on the work, took with him the young Girardon Séguier became interested in the boy and, as he had been with Le Brun, sent him to Paris and afterward to Rome In Rome, through the influence of the painter Pierre Mignard, also of Troyes, he came under the influence of Lorenzo Bernini, the greatest sculptor of that day When Girardon removed to Paris in 1652, he studied with Magnier and François Auguier and later came into relations with Le Brun and worked under his powerful direction for many years He entered the Academy of Painting and Sculpture, Jan 7, 1657, and in the same year married Catherine Duchemin, a painter of considerable skill, who was herself admitted to the Academy in 1663 In 1667 he was sent to Toulon to superintend the decorations of the vessels of the royal navy, and in 1668 he visited Rome a second time, returning to Paris in 1669 The rôle which he now played was a large one He was lodged in the Louvre, was professor at the Academy (after 1659), and enjoyed the full favor of the court In 1695 he became chancellor of the Academy The most notable works of Girardon were the monument of Richelieu in the church of the Sorbonne, Paris, which Alexandre Nenoir saved at the risk of his life in the Revolution, and the equestrian statue of Louis XIV, which once stood in the Place Vendôme The group of the "Rape of Prosperine" at Versailles may also be mentioned There are many busts, bas-reliefs, and small works in the Louvre (Paris) Of his decorative work, done under the influence of Le Brun, there is a little in the Gallery of Apollo in the Louvre The greater part of it, however, is grouped about the palace and park of Versailles Girardon was a skillful technician, but his art was somewhat theatrical and lacking in individuality Consult Coirard de Breban, *Notice sur la vie et les œuvres de Girardon* (Paris, 1850), Genevay, *Le style Louis XIV* (ib, 1886), Gonse, *La sculpture française* (ib, 1895), Lambert, *Versailles et les deux Trianons* (ib, 1900), Lami, *Dictionnaire des sculpteurs de l'école française sous le règne de Louis XIV* (ib, 1906)

GIRARDVILLE A borough in Schuylkill Co, Pa, 58 miles northwest of Reading, on the Philadelphia and Reading and the Lehigh Valley railroads It has a State hospital for persons injured on railroads and in mines The chief industry is the mining of anthracite coal Settled in 1841, it is governed under a charter of 1873 by a chief burgess, elected every three years, and a council of nine members Pop, 1900, 3666, 1910, 4396

GIRART DE ROSSILHO, zhē'rar' de rŏs-sē'lyō An epic poem composed in a northern Provençal dialect and forming part of the Car-

lovingian cycle Consult Saintsbury, *French Literature* (6th ed, Oxford, 1902)

GIRASOL, jĭr'a-sŏl (Fr, Sp, Portug *girasol*, from It *girasole*, from *girare*, to turn, from Lat *gyrus*, circle) A name given to precious stones that show reflections of bright red or yellow light, which apparently come from the interior of the mineral The name is especially applied to the *fire opal*, which is of a milky bluish color, translucent, and shows reddish reflections in a bright light The best-known specimens are found at Zimapan, Mexico, and in the Faroe Islands (See OPAL) The name has also been given to the *asteriated sapphire*, or star sapphire, fine specimens of which have been found in India Girasols were highly esteemed by the ancients and when of good quality commanded high prices They are now made artificially and are no longer so highly prized as formerly

GIRAUD, zhē'rō', GIOVANNI, COUNT (1776-1834) An Italian dramatist, of French descent, born in Rome His first play *L'Onestà non si vince* (1798) was a success After taking part in politics, he returned to the stage with *L'Ajo nell' imbarazzo* (1807) He was made director general of all the theatres in Italy by Napoleon in 1809 His comedies are amusing, but lack literary merit His *Commedie* were published in Milan (1823) The best known of them are *Don Desiderio, La capricciosa confusa*, and *La conversazione al bujo*

GIRBADEN, gēr'ba-den, CASTLE OF An extensive ruined fortress near Grendelbruch, in Lower Alsace, the inner fortress of which belongs to the tenth century and the outer castle to the early thirteenth Originally possessing 14 gates and 14 courts, it still retains evidences of the elaborateness of its design in its great square donjon, and in its hall with windows bordered with columns arranged in clusters

GIRD'ER A beam which is intended to be supported at either end and to carry a vertical load between the ends Girders are simple when they are supported only at the two ends, continuous when they extend over one or more intermediate supports as well, solid when, like a rolled I-beam, the upper and lower flanges are connected by a solid web, and braced when the upper and lower flanges are connected by an open framework of diagonal or combined diagonal and vertical members (For description of plate girders and braced girders, see BRIDGE) A box girder is a solid girder in which the flanges are connected by two web plates in such a manner that a cross section of the girder is box-shaped or rectangular in form (See ROLLING MILL for a description of steel shapes) Girders may be of timber, but they are more commonly of steel, which has almost entirely replaced cast iron and wrought iron

GIR'DLE (AS. *gyrdel*, Ger *Gurtel*, from Eng *gird*, to encircle with cord or band, connected with Eng *yard*, Ger *Garten*, and Lat *hortus*, garden) The belt fastened around the body to confine the long loose robes worn by both men and women previous to the fifteenth century (See COSTUME) It was minutely prescribed to the children of Israel to be worn by priests, made "of gold, of blue, and purple, and scarlet, and fine twined linen" (Ex xxviii. 4, 8, 33), but it was worn by others as well All through the Bible "to gird up the loins" is a common symbol of activity and alertness. The zona (Gk ζώνη) of classical antiquity was a broad band worn around the waist by young women before marriage, hence the expression *zonam virgineam solvere* is a periphrasis for marriage Men also, among the Greeks and Romans, wore a broad band or belt which often served for carrying money and other small articles The *cingulum*, sometimes called *cestus*, Gk στρόφιον, was worn higher under the breasts, as in the modern Empire costume The name *cingulum* was also applied to the *balteus*, or sword belt, which formed a regular part of the Roman soldier's uniform and usually passed over the left shoulder In the Middle Ages girdles became magnificent and expensive, being made of damask, brocade, cloth of gold, and other costly materials, and adorned with jewels and embroidery, until sumptuary laws in England and elsewhere prevented For the girdle in church vestments, see COSTUME, ECCLESIASTICAL

GIRDLE OF VENUS (trans of Lat *cestum Veneris*) A remarkable ctenophoran jellyfish inhabiting the Mediterranean, of a ribbon-like shape, some 5 or 6 feet in apparent length by about 2 inches in breadth, although, considered with reference to the structure of the animal, the apparent length is really its breadth, and the apparent breadth its length The mouth is situated in the middle of the inferior edge, and the stomach is embedded in the gelatinous substance The edges are bordered by rows of swimming plates, by the movements of which the creature seems to be propelled in the water It exhibits lovely iridescent colors by day and brilliant phosphorescence by night Its substance is so delicate that it is difficult to obtain a perfect specimen

GIR'DLER A small cerambycid beetle (*Oncideres cingulatus*), which girdles the twigs of hickory, pear, and other trees It is grayish brown, with a light-colored band across the elytra In August this beetle lays its eggs near the tips of twigs, then gnaws a deep furrow around the twig behind them The winds of autumn break off the end of the girdled twig which falls to the ground Then the eggs hatch the grubs feed upon the decaying wood, leaving only a shell of bark, and attain their full growth during the summer They then pupate and produce imagos a year from the time the eggs were laid Extensive damage sometimes results from the great numbers of these twig girdlers

GIRD'WOOD, GILBERT PROUT (1832-1918) A Canadian physician and educator He was born in London, England, and was educated at University College and St George's School of Medicine in that city In 1864 he was appointed assistant surgeon of the British Grenadier Guards He accompanied the First Battalion to Canada in 1862 at the time of the Trent Affair, and after his return to England left the army to live in Montreal He was appointed surgeon of the Third Regiment, Victoria Rifles, in 1865 and served with it during the Fenian raid of 1866 In 1872-94 he was professor of practical chemistry in the medical faculty of McGill University, Montreal, and professor during 1879-1902, after which he became professor emeritus Girdwood was also appointed director of the electrical department and the Roentgen rays, Royal Victoria Hospital, and in 1903 was president of the Roentgen Society of America He was one of the original fellows of the Royal Society of Canada in 1882, and later became a member of several scientific societies in Canada, the United States, and Great Britain He con

tributed many articles on medical and surgical subjects to the London *Lancet*, the *Montreal Medical Journal*, and the *Transactions of the Royal Society of Canada*

GIRGEH, jēr'gĕ (from Coptic *Girgis*, George, in honor of the patron saint of the town) The capital of the Egyptian province of the same name, and former capital of Upper Egypt, situated on the left bank of the Nile and about 90 miles southeast of Assiut by rail (Map: Egypt, C 2) It has a number of mosques and a government cotton factory The town is noted for its weekly market held on Tuesday The environs contain numerous ancient tombs and several cemeteries In the vicinity is an old United Copts convent Pop, 1897, 17,913, 1913, 19,893, of whom 5443 are Copts

GIRGENTI, jēr-jăn'tē (ancient Agrigentum, q v) An episcopal city, the capital of the Province of Girgenti, Sicily, on the river Drago, 84 miles by rail southeast of Palermo, 720–1080 feet above sea level (Map Italy, D 6) It is 3 miles from the Mediterranean and 6 miles by rail from Porto Empedocle (q v) through which it carries on its trade The atmosphere is usually clear and mild The town is the seat of a bishop, of an American consular agent, and is the military headquarters for the Province of Girgenti The fourteenth-century cathedral of San Giorgio, with unfinished campanile, has been completely modernized and contains a Madonna by Guido Reni and a famous ancient marble sarcophagus with relief, illustrating the story of Hippolytus (q v) In the cathedral archives are many documents of the Norman period Catacombs extend under the entire town The city museum has a fine marble statue of Apollo, vases, coins, and terra cottas Girgenti commands a beautiful view of the sea, and at sunset in clear weather Pantelleria, 90 miles to the southwest, can be seen It has a chamber of commerce, an important public library, founded in 1765 by Bishop Lucchesi, a technical school, a royal technical institute, a royal gymnasium, a royal female normal school, a seminary, and a municipal theatre The most important commercial product is sulphur, of which about 3,000,000 quintals (metric) are exported annually There are also important salt mines Other products are wine, oil, almonds, grain, cheese, honey, earthenware, salt fish For the early history of Girgenti and for the remains of its former splendor, see AGRIGENTUM Pop, 1901, 25,024 (commune), 1911, 26,823 Consult Picone, *Memorie storiche agrigentine* (Girgenti, 1865), Siro, *Le province d'Italia Girgenti* (Torino, 1886), Rocco, *Girgenti* (Bergamo, 1903), Baedeker, *Southern Italy* (16th Eng ed, Leipzig, 1912)

GIRL OF THE GOLDEN WEST, THE (La Fanciulla del West). An opera by Puccini (q v), first produced in New York, Dec 10, 1910

GIRLS' CLUBS. See WORKING WOMEN'S CLUBS.

GIRNAR, gĭr-nar'. A sacred mountain of remarkable aspect, in the peninsula of Kathiawar, part of the native State of Gujarat, Bombay, India, in lat 21° 30′ N and long 70° 42′ E, 230 miles northwest of Bombay Above luxuriant hills and valleys surrounding its base rises a bare and black rock of granite to the height of about 3500 feet above the sea The summit is broken into various peaks, its northern and southern sides being nearly perpendicular An immense bowlder, which seems to be poised on one of the scarped pinnacles, is called the Beiru Jhap, or Leap of Death, from its being used by devotees for the purpose of self-destruction On a ledge about 600 feet below the summit there is a group of 16 ancient Jain temples

GIRNDT, gērnt, OTTO (1835–1911) A German dramatist He was born at Landsberg-an der-Warthe and was educated at Berlin and Heidelberg He wrote many plays, two of which were awarded prizes at Vienna and Munich They include the comedies *Y 1* (1865), *Und, Am andern Tage, Orientalische Wirren* (1877), *Die Sternschnuppe* (1886), a farce, with Moser, *Nervos*, a farce, with Moser (1889), *Endlich* (1891), *Dreizehn* (1892) His tragedies include *Danchelmann* (1883) and *Die Schlacht bei Torgau* (1900) His novels and tales are less popular

GIRODET-TRIOSON, zhē'rō'da′ trē-ō'zŏn′, ANNE LOUIS (1767–1824) A French historical painter His real name was Girodet de Roussy, and he was born at Montargis He was adopted and educated by M Trioson, the court physician, whose name he assumed in later years He was a pupil of David, and in 1789 he took the Prix de Rome In pursuing his studies at Rome he cultivated a sentiment in his work which had not developed in the studio of David, where correct and classical drawing was considered paramount His "Sleep of Endymion," now in the Louvre, was painted at this time, it is said the figure was copied from a bas-relief In 1792 Girodet painted "Hippocrates Refusing Presents Sent from the King of Persia," a gift to Dr Trioson, who bequeathed it to the Medical School of Paris In 1802, at the request of Napoleon, he executed "Ossian and his Warriors Receiving the Shades of French Warriors," and in 1806 he exhibited his "Scene of the Deluge" (now in the Louvre), which received a prize over David's famous "Sabines," but it has been severely criticized as poor in composition "Pygmalion and Galatea," his last and one of the best works, was exhibited in 1819 His large historical pictures, the "Surrender of Vienna to Napoleon" (1808) and the "Insurrection at Cairo" (1810), both at Versailles, are less pleasing In the "Burial of Attila" (1808, Louvre), Girodet was more successful His efforts to combine the teachings of the classic with his own romantic spirit sometimes produced grotesque results, but Girodet helped to make possible the later school of the Romanticists Among his portraits that of Chateaubriand is perhaps the best He was made member of the Institute in 1815 and Chevalier of the Legion of Honor in 1816 He died in Paris and, by order of Louis XVIII, was decorated with the cross of Officer of the Legion of Honor when in his coffin Consult Coupin, *Œuvres posthumes de Girodet Trioson* (Paris, 1829)

GIRÓN, hĕ-rōn'. A town of Colombia, in the Department of Santander, on the Lebrija River. It has gold mines and produces tobacco Pop, 1912, 6202 It was founded in 1631

GIRÓN, hĕ-rōn', DON PEDRO, MARQUÉS DE LAS AMARILLAS See AHUMADA

GIRÓN, hĕ-rōn', DON PEDRO TELLEZ Y. See OSUNA

GIRÓN, FRANCISCO HERNÁNDEZ (1510–54) A Spanish soldier, born at Cáceres, Estremadura He went to the Indies in 1535 and, engaging

in the wars in New Granada, assisted in its conquest In Peru he fought under the Viceroy, Blasco Nuñez de Vela, and served ably in the army of President Gasca Becoming disgruntled he led a revolt against the government in 1553 The next year, after defeating the royal forces under Alvarado, he entered Cuzco in triumph His cause then waned, he was captured, condemned to death, and beheaded at Lima The account of the revolt is given by Girón himself in the *Rebelión de Francisco Hernández Girón* published in vol xiii of the *Colección de libros españoles raros ó curiosos* (Madrid, 1879) Consult Mendiburu, *Diccionario histórico-biográfico del Perú* (Lima, 1874–90)

GIRONDE, zhē'rôNd' A maritime department in the southwest of France, formed of part of ancient Guienne, bounded on the west by the Bay of Biscay, on the north by Charente-Inférieure, on the east by Dordogne and Lot-et-Garonne, and on the south by Landes (Map France, S, D 4) Area, 4140 square miles The surface is generally level, but hilly in the east It is watered by the Garonne, which expands into the estuary called the Gironde, and by its affluent the Dordogne At the mouth of the Gironde stands the famous lighthouse, the Phare de Corodouan, dating from 1585 Gironde is one of the principal wine-producing departments of France, over 14 per cent of the total area being vineyards The other products are grain, vegetables, fruit, and hemp The oyster industry of the Bay of Arcachon is important. Pop, 1901, 821,131, 1911, 829,095 Capital, Bordeaux

GIRONDISTS, jĭ-rŏn'dĭsts (Fr *Girondins*, from *Gironde*, a department of France) The party of moderate Republicans during the French Revolution (1791–93) When the Legislative Assembly met in October, 1791, the most remarkable group of men in it were the Deputies, most of them new men, from the Department of the Gironde Barennes, Ducos, Servière, Vergniaud, Gaudet, Gensonné, Sers, and Grangeneuve were the chiefs of their group They soon showed themselves to be orators of ability, and their moderate republicanism drew to their side such men as Brissot, Roland and his wife, Condorcet, Pétion (later mayor of Paris, 1791), Dumouriez, and Lacoste They assumed the name Girondins, controlled the *Patriote Français*, and their influence dominated the Jacobin Club. For more than a year they directed the affairs of government They had a majority in the Assembly, and the King was forced to select Roland, Dumouriez, Clavière, and Servan as ministers in March, 1792 The forced resignation of the Girondist ministry, some three months later, led to the popular insurrection of June 20. Though there were elements of dissension between the Girondists and the Jacobins as early as the spring of 1792, both parties united in bringing about the overthrow of the monarchy through the insurrection of Aug 10, 1792 The former were idealists and the latter practical men. The responsibility for the September massacres is harder to determine, but probably the leaders of the Girondists were not implicated in the atrocities of the mob, although they claimed the credit for the results After that date they lost more and more of their popularity, though their eloquence still dominated in the Assembly, which despised them as weaklings The result was that the Jacobins obtained the upper hand and ousted the Girondists from office under the National Convention Danton and his followers triumphed over Roland and his, Dumouriez deserted the side of the Revolution, and not a single Girondist figured on the newly formed Committee of Public Safety The failure of the Girondists to arrest and impeach Marat was followed by the invasion of the hall of the Convention by a Jacobin mob on May 31, 1793, and the arrest, on June 2, of about 20 of the leaders of the party Many others fled to the provinces or escaped from France Unsuccessful risings took place throughout France in their behalf, the only result being that further arrests were made On Oct 3, 1793, the prisoners were accused before the Convention of conspiracy against the Republic and were sent to be tried by the Revolutionary Tribunal On October 24, therefore, they were arraigned before this body They were at first allowed to defend themselves, but their speeches were so eloquent and their innocence so apparent that the court could not condemn them, and the Convention was forced to order that the investigation be closed, and that the prisoners be executed, Oct 31, 1793 This bloodthirsty decree was carried out the same evening Brissot, the leader of the party (from whom they were sometimes known as Brissotins), Vergniaud, Gensonné, Ducos, and 16 others were sent to the Place de Grève On the way thither they chanted the *Marseillaise* and met their death with splendid courage Others of the Girondists were subsequently brought to the guillotine, including Madame Roland, whose charms, intellect, and ardor had made her an inspiring influence in the party In the provinces also there were executions Roland, Vilazé, Rebecqui, Pétion, Buzot, and Condorcet preferred suicide to the guillotine, and by the close of 1794 the Girondist party had all but disappeared Those of the party who survived, including Lanjuinais, Defermon, Pontécoulant, Louvet, Isnard, and La Rivière, reappeared in the Convention after the fall of Robespierre and the Terrorists, but they no longer formed a party of importance Lamartine has written a panegyric on the Girondist party, *Histoire des Girondins* (Paris, 1847), translated by Ryde, and published in London in the same year For more impartial and accurate accounts, consult Guadet, *Les Girondins* (new ed, Paris, 1889), De Patris, *L'Esprit financier des Girondins* (ib, 1909), Goetz-Bernstein, *La politique extérieure de Brissot et des Girondins* (ib, 1912) In English the following are worth consulting Mignet, *The French Revolution* (London, 1826), Morse-Stephens, *History of the French Revolution* (New York, 1911) See FRENCH REVOLUTION, also the special articles on the various Girondist leaders, with the authorities referred to there

GIRON LE COURTOIS, zhē'rôN' le kōōr'twä' (Fr, Giron the Courteous) The hero of a thirteenth-century romance of the same name, by Rusticien, derived from an earlier romance, *Palamedes*, by Elie de Borron The printed edition rests upon Rusticien's version

GIROUARD, zhē'rōō'ar', DÉSIRÉ (1836–1911) A Canadian legislator and jurist He was born at St Timothée, Province of Quebec, and was educated at Montreal College and McGill University He studied law, was called to the bar in 1860, and practiced his profession in Montreal A work published by him under the title *Essai sur les lettres de change et billets promissoires* made him widely known and insured his rapid advancement in the profession He was elected a Con

servative member of the Dominion Parliament (1878), and continued a member until 1895, also acting for many years as chairman of the Standing Committee on Privileges and Elections. He strongly opposed the execution of Louis Riel (q v) and introduced and carried several bills, the most important of which was the so-called Deceased Wife's Sister Bill (1882). In 1895 he was appointed a puisne judge of the Supreme Court of Canada, retaining that position until his death His literary productions include two volumes of interesting essays upon legal subjects, a collection of historical essays on the District of Montreal, translated from the French and published under the title of *Lake St Louis, Old and New, Illustrated*, and *Cavalier de la Salle* (1893), and *Les anciens postes du Lac Saint Louis* (1895).

GIROUARD, SIR EDOUARD PERCY CRANWILL (1867–). A Canadian soldier, railway engineer, and administrator Born in Montreal, he was educated at the Royal Military College, Kingston, Ontario. For some time he was on the engineering staff of the Canadian Pacific Railway. In 1888 he was gazetted second lieutenant of the Royal Engineers, in 1891 lieutenant, and in 1890–95 was railway traffic manager at Woolwich He served under Sir Herbert (now Earl) Kitchener, with the Dongola expedition, in 1896–97, during 1896–98 was director of the Soudan Railways, and in 1898–99 was president of the Egyptian Railway Board He took part in the South African War (q v) and in 1899–1902 was Director of Railways during and after that conflict In 1902–04 he was Commissioner of Railways for the Transvaal and the Orange River Colony, in 1904 was promoted lieutenant colonel, and in 1906 became assistant quartermaster general, Western Command, Chester, England. His career as administrator began with his appointment in 1907 as High Commissioner of the Protectorate of Northern Nigeria Then, in 1909, having been Governor of that protectorate for two years, he was promoted colonel and in 1909–12 was Governor and commander in chief of the East Africa Protectorate In 1900 he was knighted He published *History of the Railways during the War in South Africa, 1899–1902* (1905)

GIROUARD, JOHN JOSEPH (1795–1855) A Canadian revolutionary leader, born in the city of Quebec Early left an orphan, he was educated by Abbé Gatien. After his admission to the bar in 1816 he practiced law at St Benoit. The disputes between the Governor and the popular branch of the Legislature in regard to the voting of supplies were then rapidly approaching a crisis. The question of responsible government was involved (See POLITICAL PARTIES, *Canada*) Girouard vehemently took the popular side and in 1830, having been elected to the Assembly, voted for the refusal of money supplies unless granted by a majority of that body. He spoke at many popular meetings, though without urging actual rebellion However, when the rebellion broke out in 1837, Girouard took command of a local body of insurgents, whom he soon advised to discontinue their resistance He fled to the United States, but returned and was imprisoned, though released next year after a proclamation of amnesty. He then returned to legal practice at St Benoit for the remainder of his life Though requested in 1842 to join the Lafontaine-Balhom ministry as Commissioner of Crown Lands, he declined

GIROUETTES, zhē'rōō'ĕt', LES (Fr, the weather vanes) A term of reproach applied in the *Dictionnaire des Girouettes* (Paris, 1815) to those who changed their political party on the return of the Bourbons after Napoleon's fall. The number of changes in political faith was indicated by a corresponding number of weathercocks printed after the names

GIRTIN, gēr'tĭn, THOMAS (1775–1802) An English water-color painter and etcher He was born in Southwark, and was apprenticed to Edward Doyes, the mezzotint engraver Girtin was one of the founders of the English water-color school and with his friend Turner inaugurated the practice of "painting" in water color, as distinguished from tinting He was a contributor to the exhibitions of the Royal Academy from 1794 to 1801, his subjects including views of London, of Paris, 20 of which he etched himself, and scenes in northern England, Scotland, and Wales, where he made extensive sketching tours, he also painted many English cathedrals In 1797 he painted a panorama of London, and in 1801 exhibited an oil painting, "Bolton Bridge," at the Royal Academy His work is characterized by largeness of manner, depth and harmony of color, bold distribution of masses, and solemn grandeur of sentiment Despite his early death from tuberculosis, which took place in London, Nov 9, 1802, he exercised a vast, though indirect, influence on modern landscape painting, and advanced the art of water-color painting in technique, color, and poetic interpretation The British Museum possesses a fine collection of his drawings Other works are found in the South Kensington Museum, the Whitworth Institute, Manchester, the National Gallery of Scotland, and the National Gallery of Ireland Consult Miller, *Turner and Girtin's Picturesque Views* (London, 1854)

GIRTON (gēr'ton) **COLLEGE.** One of the most noted institutions for the higher education of women in England, founded through the efforts of Miss Emily Davies It was established in 1869, in a rented house at Hitchin, Hertfordshire, with six students, and was conducted in the main under the influence of members of Cambridge University, from among whom its lecturers were recruited The inconvenience of its distance from that university led to its removal, in 1873, to its present location, about 2 miles from Cambridge Since then it has increased greatly in numbers and influence Its students follow essentially the same course of work as the Cambridge undergraduate who studies for honors Since 1881 its members have been admitted to the university examinations, and their names appear in the tripos, or honor lists, in the university calendar They do not, however, receive degrees from the university, but are granted degree certificates upon satisfying the university requirements The usual enrollment of the college is about 160 The buildings are very handsome, forming three sides of a quadrangle, and are in attractive grounds The administration is vested in an executive committee, a mistress, and a vice mistress, and the instruction is carried on, as in a college of the university, by lecturers and tutors Consult E E C Jones, *Girton College* (London, 1913). See CAMBRIDGE, UNIVERSITY OF, COLLEGIATE EDUCATION FOR WOMEN

GIRTY, gēr'tĭ, SIMON (1741–1818) A notorious renegade leader of the Indians He was born in what is now Dauphin Co, Pa, was cap-

tured by the Indians, along with the rest of his family, at Fort Granville, in 1756, was released in 1759, and acted as an interpreter for some time after the conspiracy of Pontiac In Lord Dunmore's War he served against the Indians and for a short time thereafter was a second lieutenant in the Virginia militia In 1776 he was appointed an Indian interpreter for the United States, but was soon discharged, after which he enlisted troops in the vicinity of Fort Pitt for service against the English He went over to the English in April, 1776, was attainted of high treason by the Pennsylvania Legislature in July, and became an interpreter in the employ of the British Indian Department His name soon became a terror throughout the Western settlements, and innumerable atrocities were attributed to him, though his influence and position among the Indians were greatly exaggerated In August, 1782, with 600 Indians he ambuscaded a party of Kentuckians at Blue Licks and killed more than 60 of them After the Revolution he acted as an interpreter for the English and was extremely active in instigating the Indians to attack the American frontiersmen He commanded the Indians who attacked Dunlap's Station, on the Great Miami, in February, 1791, led the Wyandots at the defeat of St Clair, commanded the Indians who attacked Fort Jefferson, on the Mississippi, in June, 1791, and in 1794 participated in the battle of Fallen Timbers During the latter part of his life he lived near Detroit, across the Canadian border His brothers, George (1745–c 1812), James (1743–1817), and Thomas (1739–1820), also fought with the Indians against the United States Consult Butterfield, *History of the Girtys* (Cincinnati, 1890)

GIRVAN, gĕr′van A seaport and market town on the west coast of Ayrshire, Scotland, at the mouth of the Girvan, 21 miles southwest of Ayr (Map Scotland, D 4) Weaving was formerly its leading industry and, though still carried on, has been superseded by the winter herring fishery since the enlargement of the harbor There is an export trade in coal and limestone from adjacent districts It has grown in favor as a health resort and watering place Pop, 1901, 4019, 1911, 5331

GIRY, zhē′rē′, JEAN MARIE JOSEPH ARTHUR (1848–99). A French historian, born at Trévoux, France He was educated at the Ecole des Chartres, where he held the professorship of diplomacy after 1885, and at the Ecole des Hautes Études, where he became a lecturer in 1874 He did much to promote the study of the origins of French cities and revived interest in diplomacy His publications include *Histoire de la ville de Saint-Omer et de ses institutions jusqu'au XIVe siècle* (1877), *Les établissements de Rouen* (1883–85), *Documents sur les relations de la royauté avec les villes de France de 1180 à 1314* (1885), *Etude sur les origines de la commune de Saint-Quentin* (1887), *Manuel de diplomatique* (1894). The last-named work won him election to the Academy of Inscriptions and Belles-Lettres in 1896

GISANDER, gē′zan-dĕr The pseudonym of the German author JOHANN GOTTFRIED SCHNABEL (q v)

GISBORNE, gĭz′bôrn, FREDERICK NEWTON (1824–92). A Canadian inventor and electrician, born in Broughton, Lancashire, England In 1842 he left England for a trip around the world and finally settled in Canada in 1845, where he spent two years in farming. In 1847 he entered the employ of the Montreal Telegraph Company as an operator, and in the same year was placed in charge of their new office at Quebec By close study he soon became an expert electrician, and original improvements in methods and instruments soon attracted so much attention to his work that, in 1849, he received the appointment of superintendent of the lines of the Nova Scotia government at Halifax Here he began to study the problems of ocean telegraphy In 1852 he laid the first deep-sea cable in American waters, between Prince Edward Island and New Brunswick In 1853 he went to New York City, where he became associated with Cyrus W Field, and on the organization of the New York, Newfoundland, and London Telegraph Company, was appointed chief engineer of the new company In that capacity, in 1856, he laid the land lines across Newfoundland He was the commissioner for Newfoundland at the London Exposition in 1862 and at Paris in 1865 In 1879 he was appointed superintendent of the Canadian government telegraph service, which position he held until his death Among his numerous inventions were an anti induction ocean cable, electric and pneumatic ship signals, an anticorrosive composition for the bottoms of iron ships, and an electric recording target

GIS′CO (Gk. Γίσκων) The name of three Carthaginian generals 1. A son of the Hamilcar who was defeated by Gelon at the battle of Himera 480 B C In consequence of the defeat Gisco was banished to Selinus, in Sicily, where he died 2 The son of Hanno He unsuccessfully opposed Timoleon (q v) after the latter had defeated the Carthaginians at the river Crimissus 339 B C (Consult Holm, *Geschichte Siciliens*, ii (Leipzig, 1874), and Beloch, in *Klio*, vii, ib, 1907) 3 A commander of the Carthaginian garrison at Lilybæum, at the end of the First Punic War In 241 B C he was seized and murdered by the mercenary troops who had begun the civil war called the "Inexpiable," and with whom the Carthaginian government had commissioned him to treat

GISELA, gī′ze-la (?–1043) A queen of Germany and Roman empress The widow of Duke Ernest of Swabia, she married (1016) Conrad II and was crowned with him at Rome in 1027 She exerted a considerable political influence, particularly in securing the annexation of Burgundy to the German possessions Her influence in the Church also was paramount She was celebrated for her beauty, her generosity, and her profound interest in the affairs of state and of science She was the mother of the Roman Emperor Henry III

GISLASON, gĭs′la-sŏn, KONRAD (1808–91) An Icelandic philologist, born at Longumýri and educated at Copenhagen He was professor of ancient Norse languages at Copenhagen from 1853 to 1886 and became known as a philologist through his excellent editions of the *Gislasaga* (1849) and the *Njála* (2 vols, 1875–89) and more especially through his grammatical studies of Icelandic and his Danish-Icelandic Dictionary, which is recognized as an authority on those languages Gislason bequeathed his entire fortune to the University of Copenhagen Consult *Arkiv for nordisk Filologi*, vii–viii, and *Timarit hins islenzk Bókmentafjelags*, xii

GISORS, zhē′zōr′ A town in the Department of Eure, France, on the river Epte, 33 miles northeast of Evreux It contains a richly

decorated mediæval church, and in its vicinity on a hill are situated the remains of an old castle constructed by Henry II of England The town is famous as the scene of a battle in 1198, when the English under Richard I defeated the French In this battle the expression "Dieu et mon Droit," which has since become the motto of the royal arms of England, was used for the first time by Richard I The manufacture of felt is the only industry of any importance Pop, 1901, 4801, 1911, 5508

GIS'SING, George Robert (1857–1903) An English realistic novelist, whose rare talent (or genius) was but slowly recognized Born at Wakefield, he was educated at Owens College, Manchester, and at the University of London, in both which institutions his career was brilliant He made an unhappy marriage—he was later to make a second similar matrimonial venture—and in 1876 went to America, where for some time he eked out a precarious living by writing and teaching Later he went to Germany, teaching and studying there to return to London and make literature his profession For years he suffered extreme poverty, living and writing in wretched London garrets and cellars After 1882 the legend of his abject poverty seems to have been pure fiction. From that date to the end of his life his work as a tutor and his pen kept him for the most part in comparative comfort But struggle, toil, and privation had broken his health, and he died at the age of 46 The novels *The Unclassed* (1884), *Demos* (1886), the first of his books to attract wide attention, *Thyrza* (1887), one of the best of his stories, and *The Nether World* (1889), well represent him as a minutely faithful, if not altogether sympathetic, novelist of the lower classes In the bulk of what remains of his work he is the painter of the middle and professional classes, and the best of these books are studies of unusual or abnormal modern temperaments against a middle-class background These stories generally involve problems concerning marriage, the position of woman, education, the relation of class to class, etc In this second group are *Isabel Clarendon* (1886), *A Life's Morning* (1888), *The Emancipated* (1890), the brief and inferior *Denzil Quarrier* (1892), *The New Grub Street* (1891), unsurpassed as a picture of middle-class literary life, *Born in Exile* (1892), in which the author is seen to great advantage, *The Odd Women* (1893), also a notable book, *In the Year of Jubilee* (1894), the brief but interesting *Eve's Ransom* (1895), *The Paying Guest* (1895), *Sleeping Fires* (1895), *The Whirlpool* (1897), one of the best of Gissing's novels, *The Crown of Life* (1899), *Our Friend the Charlatan* (1901), and *Will Warburton* (1905) Standing alone, must be mentioned *Veranilda* (1904), left incomplete at the author's death by a few chapters, a very knowledgeable and carefully written story of Roman life in the sixth century, which was an outcome of Gissing's lifelong devotion to classic history and literature His work includes also *Human Odds and Ends* (1898), *The House of Cobwebs* (1906), both volumes of short stories, *The Private Papers of Henry Ryecroft* (1903), a blend of fiction and autobiographic self-revelation, and the personal records of travel in *By the Ionian Sea* (1901). Gissing, if not a born story-teller, was an accomplished and singularly intelligent novelist He follows in a measure the large descriptive scheme of Tolstoy and of Zola The master of a trained and supple style, he could write at his best an imaginative prose of rare beauty and power Consult the introduction by Thomas Seccombe to *The House of Cobwebs* (1906), Paul Elmer More's illuminating study in *Shelburne Essays* (6th series, New York, 1908), F Swinnerton, *Gissing A Critical Study* (ib, 1912), Morley Roberts, *The Private Life of Henry Maitland* (ib, 1912), in which Maitland is Gissing

GITANOS, ge-ta'nōs See Gypsies.

GITSCHIN, gĭ-chēn', or **JIČIN,** yē'chēn A town of Bohemia, Austria, situated on the Cidlina, about 50 miles northeast of Prague (Map Austria-Hungary, D 1) Among the noteworthy buildings are the handsome palace built in 1630 by Wallenstein, the former Jesuits' College (now used as barracks), the fine church dating from 1655, a Gymnasium, and a teachers' college The chief industries are manufactures of sugar, machinery, and paper, it also carries on a considerable trade in grain In the neighboring Carthusian monastery of Walditz Wallenstein was interred, but in 1785 the body was removed to Munchengratz Near here, on June 29, 1866, the Prussians under General von Tumpling defeated the Austrians and Saxons under Count Clam-Gallas, thus opening the way to a junction of the two Prussian armies and the subsequent victory of Sadowa Pop, 1900, 9790, 1910, 10,204, mostly Czechs

GIUDICE, Antonio del See Cellamare.

GIUDICI, jōō'dē-chē, Paolo Emiliani (1812-72). An Italian historian and man of letters, born in Sicily At an early period he was influenced by his reading of Machiavelli, Voltaire, Foscolo, and Byron During a few months of 1848 he was professor of Italian literature in the University of Pisa, but was removed because of his liberal tendencies On the reestablishment of the Italian kingdom he was made professor of æsthetics and secretary of the Academy of Fine Arts at Florence This second professorship he relinquished in 1862 and in 1867 was elected a deputy to the Italian Parliament He died at Tunbridge, England, Sept. 8, 1872 It was his aim to show that Italian literature, which he judged with great independence, was due, not to the patronage of princes, but to the national consciousness Giudici's chief works are *Storia della letteratura italiana* (4th ed, 1865), *Storia del teatro in Italia* (1869), *Storia dei comuni italiani* (1866), a translation of Macaulay's *History of England* (1856), and an essay, "Intorno ai poeti lirici d'Italia," prefaced to the *Florilegio dei lirici più insigni d'Italia* (1846–47) Consult *Biografia di Paolo Emiliani Giudici* (Florence, 1874)

GIUFFRIDA-RUGGERI (jōōf-frē'da-rōōg-gā're), Vincenzo (1872–) An Italian anthropologist, born in Catania In 1896 he became a practicing physician in Rome, later he devoted himself to anthropology, which he taught at the University of Rome, the University of Pavia (1906–07), and, after 1907, at Naples, where he was director of the Anthropological Institute. He wrote *Sulla dignità morfologica dei segni degenerativi* (1907), *Homo sapiens Einleitung zu einem Kurse der Anthropologie* (1913), *L'Uomo attuale, una specie collettiva* (1913)

GIULIANI, jōō-lyä'nē, Giambattista (1818–84) An Italian philologist, born at Canelli (Piedmont). He studied at Asti and entered

the Somaschian Order in 1836, taking part, however, in the political movement about him He was professor at various colleges in Italy and in 1860 was made professor of literature at the Istituto degli Studi Superiori of Florence A special chair was created for him as lecturer on Dante, of whose works he had made a careful study Among his writings on this subject are *Saggio di un nuovo commento della Commedia di Dante* (1845), *Le norme di commentare la Divina Commedia* (1856), *Metodo di commentare la Divina Commedia* (1861), *Lettere sul vivente linguaggio della Toscana* (1858–65), *Il Convito di Dante Alighieri reintegrato nel testo con nuovi commenti* (1874)

GIULIANO, jōō-lyä'nō, IN CAMPANIA A city in the Province of Naples, central Italy, 8 miles northwest of the city of Naples (Map Italy, E 4) It has a baronial castle, and is delightfully situated in a plain that produces grain, vegetables, figs, and other fruit The town also has manufactures of pottery Pop (commune), 1901, 14,363, 1911, 15,963

GIULIANO DA MAJANO, jōō'lya'nō da ma-ya'nō (1432–?91) A Florentine architect and sculptor in wood, of the early Renaissance He was born in Majano and received his art education in Florence There is much dispute about his life and work, because Vasari has confused him with Giuliano da Sangallo We know from documentary evidence that in 1465 he began the church of Loreto, that in 1468 he rebuilt the collegiate church of San Gimignano, and in 1474 he began the cathedral of Faenza In 1477 he was made chief architect of the cathedral of Florence He was called to Naples in 1488 by King Alfonso of Aragon, for whom he built the fine Poggio Reale, now destroyed, and the Porta Capuana, one of the most beautiful gates of the Renaissance He died at Naples after 1491 The Palazzo Strozzi, which ranks with the Pitti Palace (q v), among the finest palaces of the early Renaissance in Florence, is sometimes ascribed to him, but usually to his brother, Benedetto da Majano (q v) He was also famous as a sculptor in wood, having executed some of the finest intarsio work in Italy His works in this line include the doors of the Sala d'Udienza, in the Palazzo della Signoria, Florence, some decorations in the Sagrestia Nuova, in the cathedral, the choir stalls of the cathedral of Perugia, an intarsio chest in the cathedral of Loreto

GIULIARI, jōō-lyä'rē, GIAMBATTISTA CARLO, COUNT (1810–92) An Italian historian of literature, born at Verona He studied theology at Rome. From 1856 until his death he was canon at Verona and librarian of the Biblioteca Capitolare He had the distinction of having established the first primary schools on Viennese models in his native city (1836). He was a member of the Berlin Akademie der Wissenschaften His principal works are *Memoria bibliografica Dantesca* (1865), *Cinque discorsi dell' Alighieri dalla sua statua in Verona* (1865–68); *Colpe d'occhio sulle biblioteche d'Italia* (1867), *Storia della musica sacra in Verona* (1874–79), *Istoria monumentale letteraria, paleografica della Capitolare Biblioteca di Verona* (1882)

GIULIA VILLA. See VILLA GIULIA.

GIULINI, jōō-lē'nē, GIORGIO (1714–80) An Italian historian and antiquary, born at Milan His work on the mediæval history of Milan (1760), based on original research of 20 years, is marked by great learning

GIULIO ROMANO, jōō'lē-ō rō-mä'nō An Italian painter See PIPPI, GIULIO

GIULIO ROMANO An Italian singer and composer See CACCINI, GIULIO

GIUNTA, jōōn'ta, **GIUNTI,** jōōn'tē, **ZONTA,** zōn'ta, or **JUNTA** A family of celebrated Italian printers, originally from Florence Two brothers, LUCA ANTONIO and FILIPPO, were booksellers in Florence as early as 1480, then the elder of the brothers went to Venice and founded a printing establishment which was continued after his death by his son TOMMASO and his cousins FILIPPO (1450–1517) started in Florence a printing house, celebrated for its editions of classics His sons, BENEDETTO and BERNARDO, printed Boccaccio's *Decamerone* (1527) Other members of the family went to Rome, and several to Spain, where GIULIO and TOMMASO were printers to the King (1595–1624) Another, JACQUES FRANÇOIS JUNTE, founded a printing house at Lyons (1520), which lasted for a number of years

GIUNTA PISANO, jōōn'ta pē-sa'nō (c 1202–58). The earliest Italian painter to emerge from the crowd during the period before Cimabue. He flourished between about 1202 and 1258 in Pisa, which was then the art centre of Tuscany and possessed an important school of sculpture, though painting was at a very low level A "Crucifix" in Santi Raineri e Leonardo, Pisa, is undoubtedly by him, and he also signed and dated a "Crucifixion" (1236), now in Santa Maria degli Angeli, Assisi Some authorities attribute to him the frescoes in the right transept of the upper church at Assisi (usually thought to be by Cimabue, q v), which are greatly inferior to those of the left transept If he varies from the Byzantine school in giving dramatic action and pathos to his figures, they seem also to be exaggerated and barbarous Consult Crowe and Cavalcaselle, *History of Painting in Italy*, vol i (London, 1903), and Thode, *Franz von Assisi* (Berlin, 1885)

GIURA. See GYAROS

GIURGEVO, jōōr'jä-vō, Rum **GIURGIU,** jōōr'gōō (the city of St George) A town of Rumania, in Wallachia, situated on the left bank of the Danube, opposite Rustchuk, 34 miles south-southwest of Bucharest, of which it is the port (Map· Balkan Peninsula, E 3) The chief landing place for steamers is the island of Smarda, about 2 miles to the east Giurgevo has a custom-house The exports consist principally of grain, salt, and petroleum Although the harbor is shallow, the annual shipping exceeds 1,000,000 tons, a considerable portion of which is carried in Austro-Hungarian vessels Nearly all the commerce between Bulgaria and Rumania passes through the town. Pop, 1899, 13,978, 1910, 15,200 Founded by the Genoese in the fourteenth century, on the site of the Byzantine town of Theodorapolis, Giurgevo subsequently became an important military post under the rule of the Turks and was strongly fortified until 1829 During the wars between Russia and Turkey it was the scene of many engagements and was taken repeatedly by the Russians.

GIURGIU See GIURGEVO

GIUSSANI, jōōs-sä'nē, CARLO (1840–1900) An Italian philologist, born at Milan, Italy He was educated at the University of Turin, at the Accademia Scientifico-Litteraria of Milan, and at the University of Pisa (graduated 1864), and he also studied in Germany at Berlin, Tübingen, and Erlangen, where he acquired a

knowledge of Sanscrit and Zend He is author of the "Grammatica sanscrita" in De Gubernatis' *Piccola enciclopedia indiana* (1868), and he translated the Indian philosophical poem, "Ashtavakragita," published in De Gubernatis' *Rivista orientale* (1867–68) Later he taught Latin at the Lyceo of Cremona and at the Accademia Scientifico-Litteraria, where he rose to be professor of Latin literature He became known especially for his fine work on Lucretius, and he translated, from the German of Guhl, *Sopra la vita degli antichi greci e romani*

GIUSTI, jōōs'tē, GIUSEPPE (1809–50) One of the most celebrated and popular of the modern poets and satirists of Italy, born in Monsummano, near Pistoia Sprung from an influential Tuscan family, Giusti was early destined for the bar He obtained his degree of LL D at the University of Pisa. On quitting Pisa Giusti was at Florence living with the advocate Capoquadri, and here he first attempted poetry. Lyrical compositions of the Romantic school, of elevated and nervous thought, were his earliest efforts, but he speedily saw that satire, not idealism, was his true forte In a preeminent degree Giusti possessed the requirements of the great lyrical satirist—terseness, clearness, and brilliancy. His writings, attaining a wider and more immediate popularity than the purely lyrical verse of Manzoni and Leopardi, exercised great political influence When the press was shackled, and freedom of thought was treason, his verses in manuscript were in general circulation throughout Italy and assisted in preparing the insurrection of 1848 Then for the first time Giusti discarded the pseudonym of "the Anonymous Tuscan," and signed his name to a volume of verses, bearing on the events and aims of the times In his political poems he abandoned the beaten track and adopted many metrical forms instead of the conventional *terza rima*, or unrhymed hendecasyllables. All his compositions are short, rarely blemished with personalities, and written in the purest form of the popular Tuscan dialect. They are in spirit and wit not only Italian, but essentially Tuscan. A reverent student of Dante, Giusti himself often reaches an almost Dantesque sublimity in the higher outbursts of his wrath, while he stands alone in the lighter play of ironical wit In politics, from taking an active part in which bad health prevented him, he was an enlightened and moderate Liberal Giusti was beloved in private life for his social qualities and his loving and gentle spirit He died in the dwelling of his friend the Marquis Gino Capponi at Florence His most celebrated pieces are entitled *Lo stivale*, or the history of a boot (Italy), a humorous narration of all the misfits, ill usage, and patching allotted to this unfortunate down-trodden symbol of his country; *Gingillino*, a masterpiece of sarcasm, portraying the ignoble career of the sycophant, *Il Re Travicello*, or King Log, *Il Brindisi di Girella*, or the Weathercock's Toast, one of his best pieces, and the *Dies Iræ*, or funeral oration of the Emperor Francis I, written in condemnation of the atrocities committed in the fortress prison of Spielberg Several of Giusti's poems have been excellently rendered into English verse by W D. Howells in *Modern Italian Poets* (1887), and into German by Paul Heyse in *Italienische Dichter*, vol iii (Berlin, 1887) Editions of Giusti's *Poesie* are those prepared by Carducci (Florence, 1859, 1893), Fioretto (Verona, 1876 and since), Biagi (Florence, 1890) Of his prose works, the *Epistolario*, or Correspondence, appeared, in a second edition (Florence, 1885), the *Epistolario scelto* (Naples, 1892) The best biography of Giusti is that prepared by Carducci for his edition of the *Poesie* Consult also Carducci's essay on Giusti in his *Primi saggi* (Bologna, 1899), Biagi (ed), *Vita di Giuseppe Giusti* (Florence, 1893), an autobiography, Leonardis, *Il Giusti lirico e il Giusti satirico* (Genoa, 1887), Horner, *The Tuscan Poet Giuseppe Giusti and his Times* (London, 1864), Spera, *Letteratura comparata* (Naples, 1896)

GIUSTINIANI, jōō'stē-nyä'nē An illustrious Italian family, distinguished in the annals of Venice and Genoa —AGOSTINO GIUSTINIANI (1470–1536) was a great student of Arabic, Chaldee, Greek, and Hebrew He prepared a polyglot edition of the Old Testament and had 2000 copies printed at his own expense —MARCANTONIO GIUSTINIANI was Doge of Venice from 1684 to 1688, during which time the Venetians temporarily wrested the Morea from the Turks — VINCENZO GIUSTINIANI in the seventeenth century built a magnificent palace among the ruins of Nero's baths at Rome and stocked it with treasures of painting and sculpture He also formed a museum of antiquities, discovered on the spot In 1807 the Giustiniani family conveyed the collection of paintings to Paris, where they disposed of the greater part by auction and privately sold the remainder, consisting of 170 fine paintings, to the artist Bonnemaison, who sold them to the King of Prussia This fragment of the famous Giustiniani Gallery now enriches the Berlin Museum, and a very few of its former treasures are still to be found in the Giustiniani Palace at Rome Consult Hopf Carlo, *Storia dei Giustiniani di Genova* (Genoa, 1882)

GIUSTINIANI, LEONARDO (1388–1446) An Italian poet, born at Venice, a humanist and a translator from the Greek, orator, epistolographer, and Procurator of San Marco, he is best remembered for his *canzonette* The 27 strambotti that have been attributed to him contain all the themes of the Italian popular songs and resemble them in compactness of form and spontaneity of sentiment Some of the *canzonette* set to music by Giustiniani himself and called *Giustiniane*, sometimes *Veneziane*, were sung at banquets and upon festive occasions in general Their subject matter is erotic, their tone familiar, and their language full of dialectal peculiarities Consult Wiese, *Poesie edite ed inedite di Leonardo Giustiniani* (Bologna, 1883), Lamma, *Intorno ad alcune rime di Leonardo Giustiniani*, *Giorn stor* (1887), Ortolani, *Appunti su Leonardo Giustiniani* (Feltre, 1896), and Oberdorfer's articles in *Ateneo Veneto* (1912) There is a biography by Fennigstein (Halle, 1909).

GIVET, zhē'vā' A town in the Department of Ardennes, France, on both banks of the Meuse, about 1 mile from the Belgian frontier, and about 23 miles from the Belgian town of Namur (Map· France, N, K 2) It was formerly a fortress of considerable strategical value, but in 1892 the fortifications were dismantled, and, with the exception of the citadel of Charlemont, converted into promenade grounds In the European War of 1914 Givet was on the early line of the Allies' defense against the Germans and was the scene of a stubborn resistance by the British expeditionary force under Sir John

French in the latter end of August The town contains a number of breweries, tanneries, pencil factories, and marble quarries Pop, 1901, 6947, 1911, 7759

GIVORS, zhē'vôr'. A town in the Department of Rhône, France, on the Rhone and the Gier, 14 miles south of Lyons (Map France, S, J 3) It contains numerous establishments for the manufacturing of machinery, bottles, and window glass, and there are important coal mines in the vicinity. Pop, 1901, 12,132, 1911, 12,784

GIZEH See GHIZEH

GIZZARD, giz'ard (from OF *gezier*, Fr. *gésier*, gizzard, from Lat *gigeria*, cooked entrails of poultry) A strong muscular portion of the alimentary tract, where hard solid food is broken up preparatory to digestion Gizzards are found in various groups of animals and have only a physiological likeness The best-known example is that of birds, which is the posterior compartment of the stomach, the front part being glandular and fitted to moisten the food to be crushed The degree of development of the gizzard of birds depends upon the hardness of the food eaten Grain-eating birds have the most powerful gizzards, insect-eating birds less powerful ones, while in birds of prey the gizzard is slightly developed The great anatomist, Hunter, indeed, believed that a strong gizzard could be cultivated in carnivorous birds by feeding them on grain, and this has been accomplished in the case of captive gulls In the gizzard of birds small stones are frequently found, which are swallowed by the bird to aid in triturating its food Among other animals in which a gizzard has been described are certain Rotifera, Bryozoa, the earthworm, the crayfish and its allies, and various insects, especially such as devour solid food The "gizzard" of insects and crustaceans is the fore stomach, or proventriculus, it is by some authors regarded as mainly a strainer See BIRD, ALIMENTARY SYSTEM

GIZZARD SHAD (so called from the shape of its stomach) A name in Florida for the mud shad (q v) See Plate of HERRING AND SHAD

GJALLAR, yal'lar (Icel *yeller*). The horn which, according to Scandinavian mythology, Heimdall blows to notify the gods when a stranger is approaching the bridge Bifrost

GJELLERUP, yĕl'le-rup, KARL ADOLF (1857–) A Danish novelist, born at Roholte, Zealand He became a warm advocate of Greek and German art and a devoted admirer of Richard Wagner, upon whose famous "Trilogy" he wrote the work entitled *Richard Wagner i hans Hovedværk Nibelungens Ring* (1890) Besides a collection of poems entitled *Min Kjærligheds Bog* (1889), and the dramas *Brynhild* (1884), *St Just* (1886), *Thamyris* (1887), *En Arkadisk Legende* (1887), *Hagbard og Signe* (1888), *Bryllupsgaven* (1888), *Herman Vandel* (1891), *Wuthorn* (1893), *Hans Excellence* (1895), *Mollen* (1896), *Gift og Modgift* (1898), *Offerildene* (1903), *Elskovsproven* (1906), and *Den Fuldendte Hustru* (1907), his works include several admirable tales of travel and the popular novels entitled *Det unge Danmark* (1879), *Germanernes Lærling* (1882), *Minna* (1889), *Romulus* (3d ed, 1903), *Vandreaaret* (1885), *Konvolutten* (1897), *Pilgrimen Kamanita* (1906), *Fra Vaar til Host* (1910), and *Verdensvandrerne* (1910) His dramas are not well adapted to the stage, because of the deficiency of the dialogues, but his lyrical verses and novels are popular

GLACE (glas) **BAY** A town in Cape Breton Co, Nova Scotia, Canada, about 15 miles east-northeast of Sydney, on the Sydney and Louisburg Railway (Map Nova Scotia, K 2) It is an important coal-mining centre, about 10,000 miners being employed in the vicinity There are also a fishing industry, machine shops, and a wood-working factory Large supplies of coal are shipped from the harbor to Canadian and other ports An important Marconi wireless station is located here The town has a mining school, and owns its electric-lighting and water systems. Pop, 1901, 6945, 1911, 16,562.

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